JUNE 6, 1955 NEWS ISSUE

Electrical World

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Special Crew Speeds Line Building . . . Page 16

Fuel Cell Produces Electricity . . . Page 30

Industry Profits from Electric Heating . . . Page 25

2 Challenges Face Electric Industry . . . Page 48

E B POWER GS W 12
UNIVERSITY MICROFILMS IN
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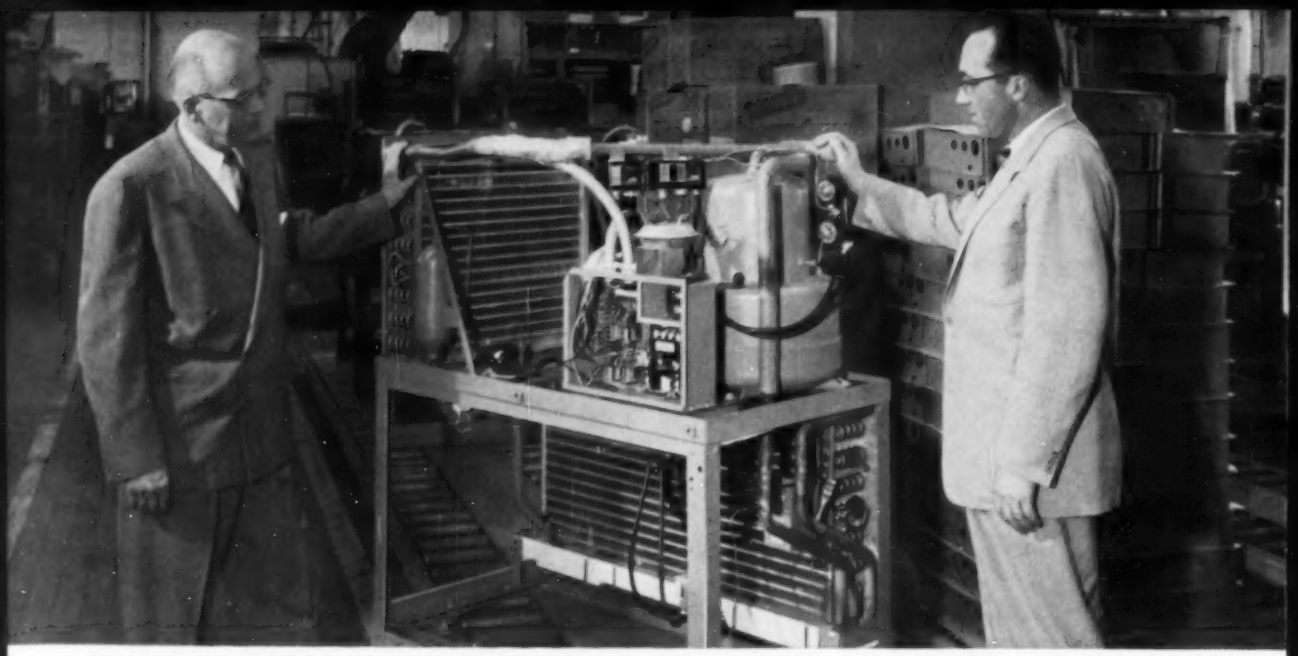

NEW MOTOR helped reduce cost of new Weathertron heat pumps, making them available to more customers. Refrigeration circuit of a G-E unit is discussed here by H. M. Brundage (left) General Manager, Weathertron Dept. and P. F. O'Neill, Manager—Utility Contacts, Weathertron Dept.

NEW HOUSING DEVELOPMENTS hold greatest potential of high air-conditioner saturation in many parts of the country, would be likely candidates for three-phase service. But, recent studies by D. K. Blake (right), Manager—Distribution Engineering, indicate that single-phase will be satisfactory.

Can single-phase serve future residential loads?

Whether future residential motor loads will require single-phase or three-phase service has long been a distribution question—and in many cases has had no clear-cut answer. Now, economic advantages favor single-phase service for air conditioners and heat pumps, the primary motor load builders.

MOTOR LOAD GROWTH

Where growing home motor loads previously seemed to require three-phase service, because of the much higher initial cost to the user of single-phase motors, G.E.'s new hermetically-sealed single-phase motor now has economic advantages for both customer and utility. Even at 100% air-conditioner saturation in housing developments, there is no real advantage to three-phase.

LESS EXPENSIVE MOTORS

For example, the open type five-hp three-phase motor used to cost about $275 less than the single-phase. The new line of hermetically-sealed motors has reduced this difference to about $70, less than the cost of three-phase service. All things considered, single-phase appears to fulfill the requirements of the residential secondary systems of the future.

As suppliers of equipment for both the home and the utility, General Electric's designers and engineers work together to meet the needs found on "both sides of the meter." When you are concerned with system modernization or expansion, be sure to contact your G-E Apparatus Sales Representative early in your planning. General Electric Co., Schenectady 5, N. Y. 301-303

MORE POWER TO AMERICA

GENERAL ELECTRIC

Electrical World

Published for 81 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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• • •

COMING NEXT WEEK—The details of how a dual cycle boiling reactor works. General Electric Co has developed such a reactor for Commonwealth Edison Co's nuclear power plant.

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OPERATION VOLTAGE REPORT NO. 2

Key facts in the application of regulators and capacitors

FIG. 1

NO CORRECTION

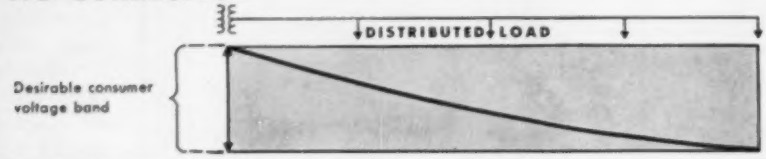


FIG. 2

ADD ONLY A REGULATOR

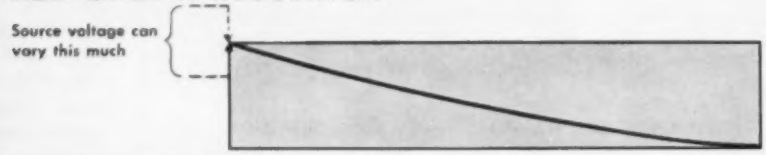
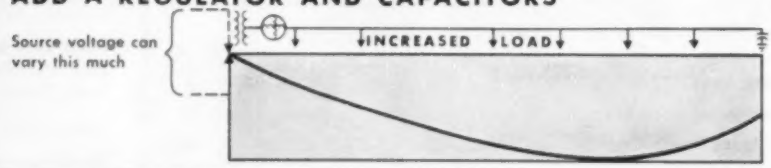


FIG. 3

ADD ONLY CAPACITORS

FIG. 4

ADD A REGULATOR AND CAPACITORS



What happens to system voltage when capacitors and regulators are installed?

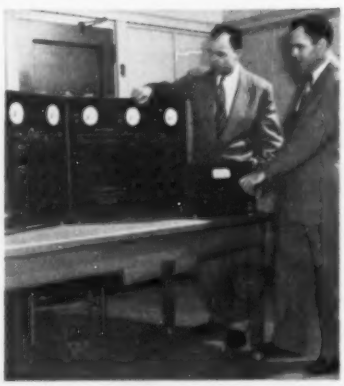
Figure 1 shows a full-load voltage profile along a distribution feeder with no voltage corrective devices. Figure 2 shows how a voltage regulator is capable of bucking and boosting varying source voltage so as to maintain voltage within limits all along the feeder.

Figure 3 shows what happens when only a switched capacitor bank is added to the feeder: The voltage spread along the feeder is reduced and additional feeder loading is possible.

Figure 4 shows the result of the addition of voltage regulators and switched capacitors: When used together, they provide an ideal means of accurately controlling voltage and increasing system capacity for additional load. This produces satisfied customers, as well as providing the best return on system investment.

In fact, for all systems, the use of capacitors and regulators ***always*** results in superior voltage control and greater system load carrying capacity.

G-E engineers have just completed a comprehensive study of the problems of feeder voltage regulation. This report is the second in a series dealing with the important results of the study. If you would like to discuss voltage problems on your system, contact your G-E Apparatus Sales Engineer. General Electric Co., Schenectady 5, N. Y. 645-2



Portable demonstrator being used by G-E Engineers R. M. Butler and D. R. Samson to show effect of capacitors and regulators under variety of feeder load conditions.

GENERAL ELECTRIC

EDITORIALS

Service Entrances—Gateway or Bottleneck?

Last week's editorial cited meters as a measure of the industry's unpreparedness for meeting the residential loads of tomorrow. Meters are a convenient index of ability to serve because their capabilities can be established. But meters are not alone in this inadequacy. Service entrances also threaten to stall today's swing to electrical living.

Nothing less than a 3-wire connection can serve electric ranges and water heaters. Interpretation of window room coolers as non-portable devices can push the larger sizes into 240-v connections.

Yet Electrical World's Survey of Meter and Service Trends published last week revealed that 30% of the residential services for the average utility remain 2-wire and 68% of the utilities report no program to change them. Those which do have programs underway show improvement in percentage of 3-wire services, even though the group includes several which have started too recently to achieve the full effect.

Forecasts indicate that electrical living of the future will not be content with window room coolers. Instead many homes will include central air conditioners for year-round use. Some in the northern climes may even supplement a central unit with space heaters for some areas. For such homes nothing less than 100-amp service entrances could suffice. But for all-electric living, we must look to 200-amp entrances.

But utilities reporting in this same survey disclose reluctance to advocate 100-amp facilities. Some disdain even to express concern over the size of the entrance, leaving selection of size entirely to inspection authorities.

Growing importance of residential loads dictates that utilities have an increasing dependence on adequate wiring on both sides of the meter. The service entrance appears to be as good a place as any to start the ball rolling. Adequate entrance facilities, themselves, would bring major economies in any future expansion job. They will also encourage more adequate initial home installations by the owner.

It falls to the lot of utilities to make the service entrance the gateway—not the bottleneck—to electrical living.

Street Lighting in the Public Interest

"More good ideas and more well worked-out plans go down the drain from lack of proper human relations than for any other reason." This statement was made by Dr William G. Willis, University of Pittsburgh political science professor, before the recent street lighting conference of Pennsylvania Electric Association.

Improved street lighting in the nation's cities and towns, Willis went on to say, is dependent on educating municipal and other local officials to the needs for and benefits of adequate lighting.

Men who develop and manufacture street lighting equipment have come a long way in providing fixtures and lamps to meet various lighting requirements. Lighting men across the country along with highway engineers have developed standards and are able to lay out systems to meet the most demanding situations. Men who promote and sell outdoor lighting have come up with impressive studies of the benefits provided by proper street lighting.

Ultimate goal of this technical progress is to provide safer and more attractive lighting for the streets and highways. It means translating the technical language of lumens and reflectance into the human language of accident and crime prevention, community pride, and business stimulation.

It boils down to selling through the medium of adult education and better human relations. It must be aimed at local government officials and those who elect them. It requires understanding a community's needs and ability to finance a lighting system. Such a program must be pursued day in and day out by the people who are convinced that proper street lighting is in the public interest.

World Competition on Our Own Basis

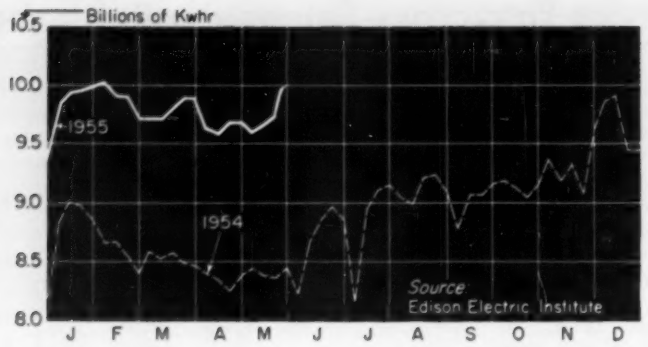
Peacetime nuclear power will hold the world spotlight at the United Nations conference to be held Aug. 8-20 at Geneva. Thus electric power production becomes one of the issues in the cold war. Already you can see the East and West moving up their peacetime artillery.

Our own Atomic Energy Commission plans to install a working reactor right on the conference grounds. It is known, too, that the U. S. will unveil a new reactor system that holds considerable promise for more economic production of electric power from nuclear sources. Britain, too, will probably throw in a show-stopper, and other Western Nations will make contributions.

On the other side, Russia has already indicated she will disclose plans and perhaps some operating data on a power reactor claimed to have been in operation for more than a year. Perhaps there will be information on Russia's plans for large scale reactor development.

It is possible that some of the neutral nations will also have something to contribute and much to learn.

Certainly it is better for the East and West to meet in this kind of technological competition than in one aimed at military destruction. U. S. industry, in fact, should relish this kind of competitive situation because it is the kind that industry faces every day on the home front.



OUTPUT

Week Ended May 28
9,976,000,000 Kwhr
Up 18.3%

Atomic Energy Commission requirements — 808,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 13.1%.

Per Cent Change from Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
May 28	+18.3	+10.5	+13.1	+25.2	+7.9	+26.1	+18.9	+6.1	+9.6	+8.7
May 21	+16.2	+5.1	+8.0	+23.1	+7.7	+23.6	+16.4	+9.1	+13.5	+7.7
May 14	+15.4	+6.3	+8.1	+22.1	+8.0	+21.7	+18.4	+7.0	+10.8	+5.8

Seasonally Adjusted Index 199.3 Week Ago 194.6 Year Ago 169.0

The Issue's News Highlights . . . REA is 20 years old. In recognition of the anniversary, EW surveys the work of five administrators who have served since the agency was born in New Deal days . . . TVA board members split over proposals to privately finance TVA with revenue bonds . . . Congress' delay of legislation for power projects appears as part of plans for next year's presidential campaign. The Administration's partnership policy is expected to shape into a major issue.

Atomic Power: Northern States Power, Minneapolis-Honeywell Regulator, and General Mills, have set up organization called Minnesota Nuclear Operations Group to determine what role atomic energy can play in state's future . . . Southern Co expects to participate in Atomic Power Development Associates group and will contribute $2.5 million to proposed $45-million reactor plant, according to Chairman E. A. Yates . . . U. S. has signed agreements with Brazil and Colombia under atoms-for-peace plan whereby it will provide fissionable fuel and reactor information. More such agreements are expected to follow.

Regulatory: Alabama PSC has approved application of Alabama Power to purchase Liddell Power Co of Camden for $275,000 . . . Dayton P&L has received Ohio PUC permission to acquire Lake Gas Co of Russells Point by exchange of stock . . . Windover L&P has obtained Utah PSC approval to reduce electric rates 15%.

Nebraska's Gov Victor Anderson is politely telling state's public power leaders to stop squabbling and get together if state is to meet its power needs for future. Trial is currently in progress on litigation over future building control. Anderson notes that it is going to be necessary "to borrow astronomical sums of money through the issuance of revenue bonds to provide generating facilities."

Sweden is still only country to have introduced 380 kv for long-distance power transmission, according to Folke Petri of Swedish State Power Board. It is probable they will have to reckon with still higher voltages in future, perhaps up to 650 kv, he adds . . . With "complete cooperation" of three railroads, Cleveland Electric Illuminating and Pittsburgh Consolidation Coal have signed contract for delivery of 18 million tons of coal over 15-year period by pipeline from Georgetown, Ohio (EW, May 23, p 7). The new pipeline will go under the rail lines at 11 places.

A tax up to 5% of gross receipts of local utility companies has been introduced in Illinois State Senate by Sen William Lynch (D-Chicago). Electric, gas, telephone, and water companies will be affected.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Off the Washington Wire: Because of activities in Republican politics, Des Moines attorney Allen Whitfield is expected to have only a 50-50 chance of being approved for the AEC. Democrats are expected to give him a rough time . . . David F. Shaw, manager of Hanford Operations Office, has been named AEC assistant general manager for operations. His assistant, James E. Travis, will be acting manager at Hanford . . . Council of State Chambers of Commerce, in special study, says legislation by federal power advocates to block private power dams at Hells Canyon would be "biggest step taken toward socializing electric power in U. S. since the federal monopolization of power in the TVA." At same time, Rep Ben F. Jensen (R-Ia.) says proposed federal dam would be inferior as power producer to other projects proposed on Columbia river tributaries.

Power Cost to AEC from OVEC's Clifty Creek and Kyger Creek plants is expected to be 0.06 mill per kwhr under original estimate. Savings to AEC will reach $1 million annually despite construction costs now estimated at $32 million over original estimates based on February 1952. Offsetting factors have been generating capability higher than anticipated and renegotiation of interest charges.

Kentucky Inter-Industry Farm Electric Council has adopted broad program for promoting wider use of electricity in rural areas. Program includes: Publication of directory of manufacturers, distributors, and dealers of electrical farm equipment; survey of all Kentucky schools teaching home economics to determine their needs for new and additional appliances; and other steps to increase use of electricity.

Alabama Power is installing an electric hydraulic dredge in a pond at Gorgas Steam Plant to pump flyash to a storage area about one mile away. In case dredge fails, pond provides a surge capacity for 30-day discharge of flyash under present generating conditions.

Rockland L&P's rapid growth was outlined to New York Security Analysts by Pres C. L. Hulswit last week. He cited these increases from 1945 to 1954: Kwhr sales 253%; revenues from electricity sales 124%; mcf gas sales 431%, and gas revenues 309%; and annual residential use of electricity from 907 kwhr to 2,002 kwhr.

ABOUT PEOPLE IN THE INDUSTRY

Builders of MVGC's plant at West Memphis, Ark., "have not the remotest thought of turning back," Middle South Pres Edgar H. Dixon told Memphis, Tenn., Kiwanis Club last week. He noted efforts by opponents of project to block SEC approval of financing arrangements. But, said he, "in spite of these time-consuming obstacles, and others that may follow, we are going to do everything we can to complete the plant on schedule. Moreover, we are going to make every effort to meet or improve upon our cost estimates."

Supporters of free enterprise "can take pride" in response of electric utilities to nuclear development program, H. J. Scholz, president, Southern Services, Inc, told stockholders meeting. If the industry "should be timid . . . the government itself would undertake the job" with the benefits going to the public power agencies. This "could not fail to be detrimental to the investor-owned industry." Here "was a major challenge to the free enterprise system" that was gratifyingly accepted, said Scholz.

More News About People page 36

M. L. COOKE (1935-37)

J. M. CARMODY (1937-39)

H. SLATTERY (1939-45)

C. R. WICKARD (1945-53)

A. NELSEN (1953—)

Work of five administrators appraised as . . .

REA Celebrates Its 20th Birthday

The Rural Electrification Administration, after 20 years of operation, has become an important and familiar part of the American political, social, and economic picture.

This year, as it celebrates the completion of its first two decades and the survival of an important wartime investigation and numerous political squabbles, REA pointed proudly to these accomplishments:

• During its lifetime, the number of U. S. farms provided with electricity has increased more than 80%. When the agency was born in 1935, slightly more than 10% of U. S. farms were connected to central power stations. In June of this year, it is estimated that 93% of American farms will have been connected (see table).

• Within the last ten years, REA loans have stimulated the growth of rural electric co-operative generating capacity from 95,846 kw to 880,000 kw (see table).

• Cost per kwhr of REA-backed electricity dropped from 4 mills in 1948 to 3.1 mills in 1954 (see table). Average annual consumers' bills decreased 8.7% in 1954, although energy sales of borrowers rose 13.9%, reaching $1 million a month last year.

• Borrowers have repaid 15.4% of the amount they've taken out of the Treasury, and they've paid in as well about $200 million in interest. Loans authorized in REA's lifetime total $2,990,177,211, of which $2,558,773,308 had been drawn down by co-operatives and Public Utility Districts for investment in facilities as of March 31, 1955. The remaining $440 million authorized for loans has not yet been drawn down. Fully repaid as of March 31, was principal of $394,621,321, plus the $200,610,477 in interest. Thus, REA borrowers have already repaid to the Treasury $594,231,798 against the $2.5 billion they've borrowed.

• Only $504,052 is overdue more than 30 days. This includes $386,520 in principal and $116,400 in interest. Thirteen borrowers are behind schedule.

• Average consumption per farm on REA-financed systems rose from 61 kwhr in 1941 to 236 kwhr in 1954.

• The average REA borrower is a $2-million business.

• At the beginning of this year,

REA systems were serving 2.7 million farms and 4 million consumers.

REA was set up by President Franklin D. Roosevelt in 1935, and one year later a friendly Congress gave it legislative sanction. Roosevelt appointed Morris L. Cooke as administrator on May 20, 1935.

Cooke, who had been director of the National Resources Board's Water Section, served with REA until Feb. 22, 1937. He is now an engineering consultant in Pennsylvania.

John M. Carmody succeeded Cooke in 1937. He stayed on until June 30, 1939.

Stormy Administration

In September of that year, the most controversial administrator in REA's history took over. He was the late Harry Slattery, a former under secretary of Interior and protege of Harold Ickes and Gov Gifford Pinchot of conservation fame.

Slattery had been instrumental in working out rural electrification legislation. During his six-year tenure, however, Congress conducted a major investigation of REA's administration, and Slattery was asked to resign at least four times by Roosevelt's staff. His authority was bypassed, presumably on White House orders. He failed to sit out his ten-year term, and moved on to the National Power Policy Commission toward the end of the second World War.

Claude R. Wickard came into office at REA in the spring of 1945 during President Harry Truman's reshuffle of the old Roosevelt cabinet. Wickard had been Secretary of Agriculture for five years, but took his demotion and stayed on the job until replaced by the present administrator, Ancher Nelsen, on April 29, 1953, when the Republicans came into power.

During the Roosevelt and Truman administrations, REA became a potent political force, both nationally and locally. Congressmen from urban areas have often fought its financial demands, and rural representatives have not always seen eye to eye with its staff on how it should operate. But none has been able to weaken it or to slow down its lending activities. No member of Congress representing a rural constituency now dares oppose it.

For its first 18 years, the agency rocked along with well-heeled congressional backing, with a liberal loan policy regarded by many as reckless. But even the Republicans, now at the helm, are proud of the repayment record of its borrowers.

When Nelsen assumed office under President Eisenhower, the depression-born agency underwent some basic changes. Its personnel was reduced and its loan-processing procedures streamlined. Borrowers who had proved themselves in the past to be good financial risks were dealt with more quickly, without time-consuming audits.

Budget cuts were instituted in line with Republican policy. The first time this was tried, suspicious Congressmen insisted on raising the budget request. Nelsen did not use these funds the first year.

But as he tried to reduce expenditures while keeping the coffers open to deserving systems, Nelsen ran into new demands of a type REA had not had before. In the past, the aim was primarily to supply enough low-cost federal money on a long-term loan basis to make it possible to spread the use of electricity throughout rural America.

Shifted Emphasis

In the last several years, the emphasis has shifted to loans for already-established cooperatives with loads increasing because of greater use of electricity on connected farms.

This has created a headache for the present administration because, under the original act, half of REA's yearly loan authorization is earmarked for use in thinly-electrified areas. The new demands are for capital in large quantities to finance new generating capacity and heavying-up lines. Under the restrictive formula, REA felt it would be forced to deny some requests.

Nelsen asked for a change in the law to repeal this restrictive formula. He hasn't got it yet, but the Senate has approved a compromise which would

(*Continued on next page*)

Percent of U. S. Farms With Electricity

Year	Percent
1935	10.9
1940	30.4
1945	45.7
1950	77.2
1952	87.1
1953	90.8
1954	92.3
1955	93.0*

* First quarter estimate.

REA Systems in Review

Calendar Year	Energy and Revenue—(000 omitted)*				Total Cumulative Capacity (kw)	Avg. Cost to Farm Consumer (¢ per kwhr)
	Purchased (kwhr)	Generated (kwhr)	Billed (kwhr)	Annual Revenue		
1941	854,370	83,123	724,385	$35,022	.....	.....
1942	1,304,623	131,189	1,150,536	46,927	.....	.....
1943	1,828,132	199,228	1,679,381	55,588	.....	.....
1944	2,165,332	213,462	1,925,734	64,043	.....	.....
1945	2,344,550	258,397	2,136,384	73,607	95,846	.....
1946	2,730,265	319,913	2,477,509	89,948	114,678	.....
1947	3,720,705	433,282	3,398,290	114,998	184,050	.....
1948	5,018,725	718,283	4,757,051	151,674	252,868	4.0
1949	6,541,739	903,412	6,227,471	197,029	310,579	3.9
1950	8,164,801	1,076,946	7,778,735	241,373	411,706	3.7
1951	9,999,422	1,412,640	9,738,486	285,141	528,421	3.6
1952	11,757,007	1,639,848	11,534,359	323,575	571,901	3.4
1953	13,737,814	2,103,446	13,755,494	366,428	678,304	3.3
1954	16,057,924	2,719,644	16,467,087	412,860	880,000**	3.1

* Includes estimated data for the portion of the system financed by REA for jointly financed systems.

** Preliminary estimate.

REA's Birthday

(Continued from previous page)

permit REA to use 75% of its yearly authorization as it sees fit, earmarking only 25% for unelectrified areas.

With federal money, Nelsen has helped several co-operatives increase capacity by getting together with neighboring private utilities in building new generating and transmission facilities to be run by the utilities as part of their systems, with the co-ops drawing power from them. Several of these have already gone into operation, and others are in the works. This has put him in a lot of hot water with Democratic Congressmen and representatives of national rural co-operative associations. They claim he is trying to subordinate co-op interests to those of the utilities.

Controversial Policies

Nelsen's policies are controversial, but his approach is at least a solid one. He's faced with a big problem, one of rechanneling the agency's functions in an altogether new direction, and he's turned to utility-cooperative integration and greater discretion in use of loan funds as one way to meet the challenge.

That the trend is toward heavying-up systems and building greater capacity was shown by a recent REA survey of borrowers' needs. The borrowers themselves reported that they'll need in the neighborhood of $200 million next year — almost twice as much as Congress authorized this year for loans. They reported a total need through 1960 of almost $700 million—and REA regards this as conservative because it's projected so far in the future. The greatest proportion of estimated loan needs was for generation and distribution construction and system improvements.

Future Role

REA's telephone program runs second to its electrification functions, but it too plays an important part in the agency's life.

The future role for REA can best be summarized by quoting the agency's own estimate of power requirements for systems it finances. Recently the agency said it expects power requirements to double by 1965 and triple by 1975—going from a net input of 13.7 billion kwhr in 1953 through 30.4 billion kwhr in 1965 to 45 billion kwhr in 1975.

Ebasco Completes Greek Project

Greece's 175,000-kw Electrification Program was completed late last month with dedication of the Ladhon Hydroelectric Development (shown above) consisting of two 25,000-kw vertical units on the Ladhon River. Ebasco Services, Inc, has managed the design, construction, and initial operation of the system as well as the training of Greek personnel to operate the project.

TVA Board Split on Financing

The Tennessee Valley Authority board is split along party lines over the Administration's changes in the power agency's plans to finance itself.

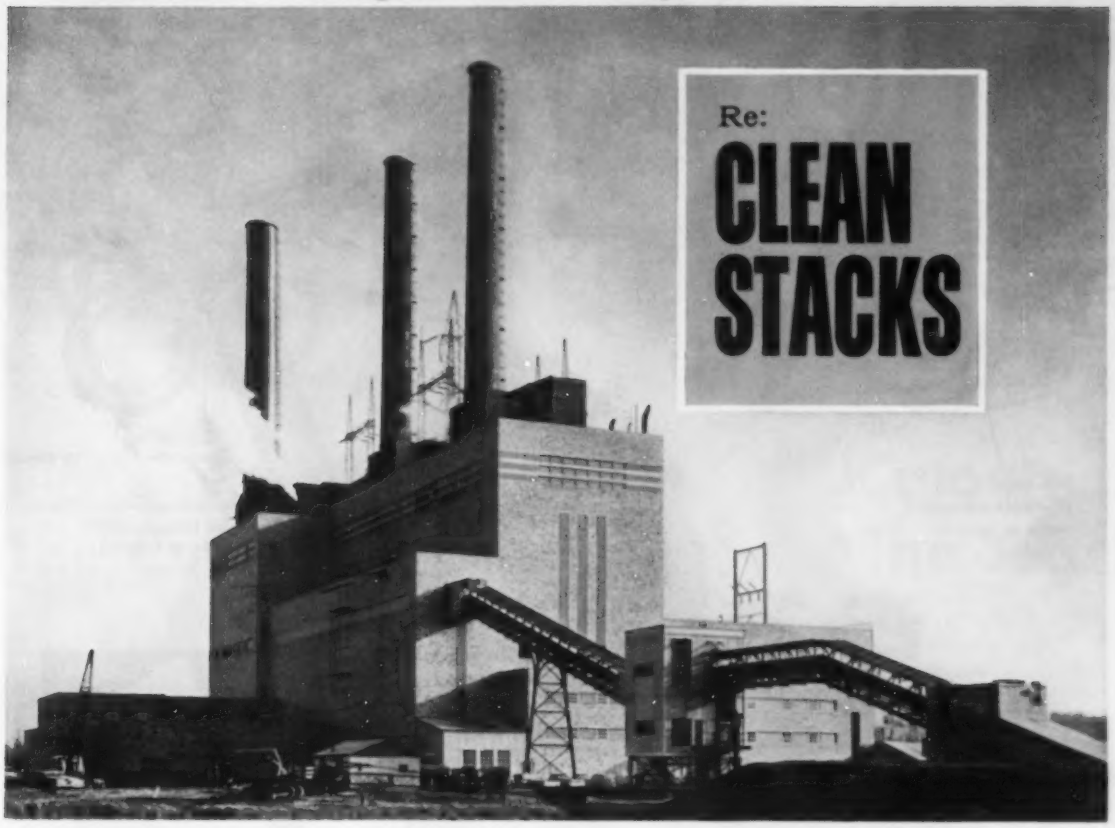
Board Chairman Herbert D. Vogel recently made it known that he could see nothing wrong with the Budget Bureau's revisions in TVA's revenue bond plans. In so doing, he disagreed once again with fellow board members Harry Curtis and Raymond Paty, who stood pat on their original proposal.

Here's where the Budget Bureau's ideas conflict with the board's scheme:

- There would be a $750-million ceiling on the amount of bonds TVA could have outstanding. At least $250 million of appropriated funds would be required to be outstanding as a minimum government investment in TVA at all times.
- Bond issues would have to have approval of the Secretary of the Treasury and of Congress, although the Treasury would not be required to buy the bonds as the board had planned. The Secretary would regulate sales.
- Bond interest would be the average interest the government pays on obligations of 15 years or more, rather than at the cost of money to the government. TVA would be required to continue to amortize its power facilities within 40 years from the date of initial operation, rather than paying interest on schedule and stretching principal payments if necessary.
- The TVA aim of supplying power at the lowest possible cost would be removed in favor of one to require the agency to charge rates adequate to retire its bonds and the government's investment.

In a letter to Public Works Committee chairman in Congress, Vogel said the other members of the board felt that some of the Budget Bureau's changes would create serious problems for TVA. But he felt the revisions would present no serious obstacles or restrictions to the operations of the agency. He urged immediate passage, since TVA has received no new appropriations to finance facilities.

Research for New Savings in Power Plant Operations

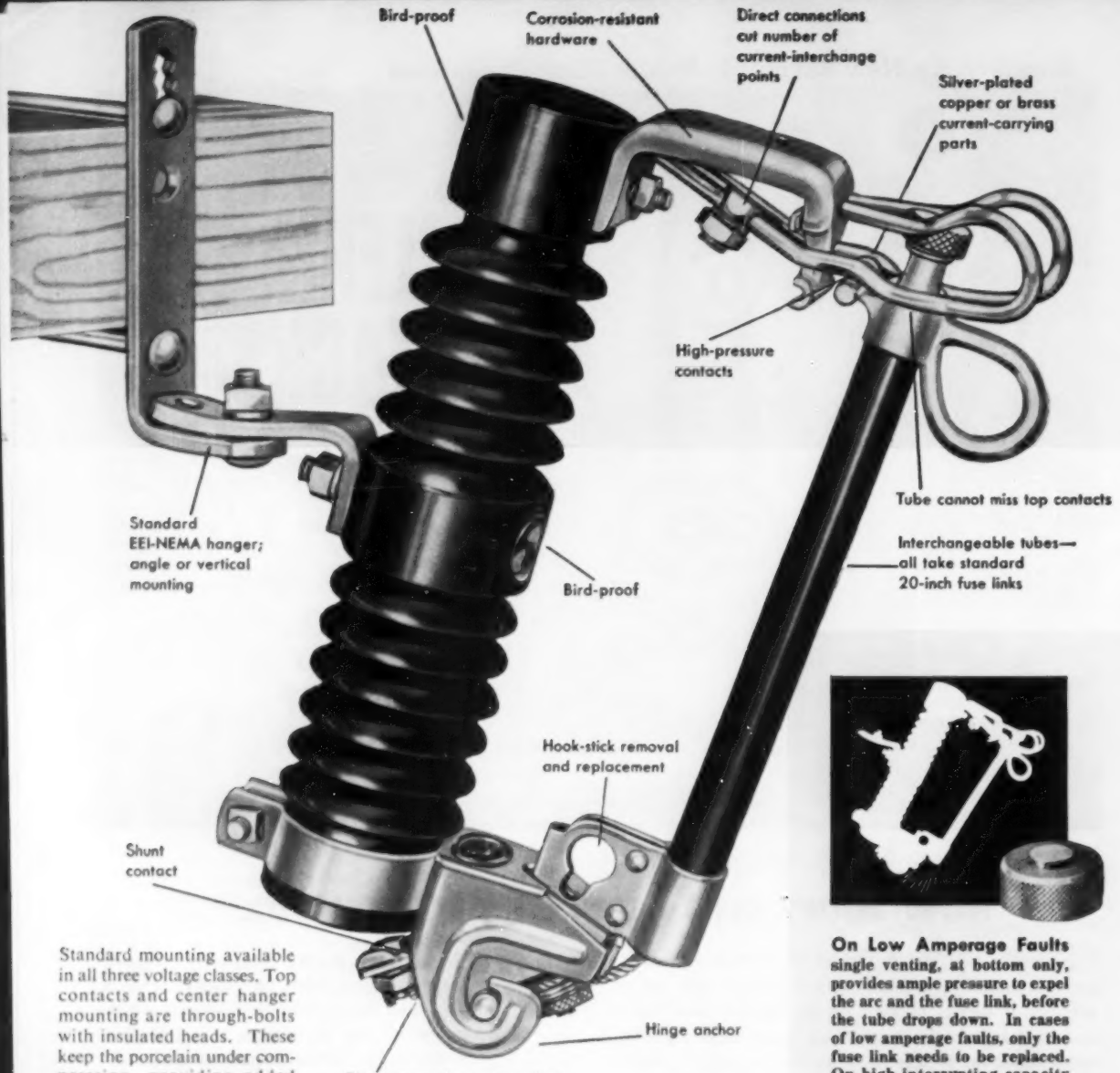


HOW MANY MILLS PER KILOWATT-HOUR?

Public utility men, always anxious to eliminate air pollution and improve community relations, have spent many millions of dollars to hold fly-ash emission and other stack discharges within permissible limits. Being equally conscious of the need to hold the line on cost of power plant construction and operation, they are naturally seeking ways to cut the costs of obtaining clean stacks.

B&W's concern with clean stacks is reflected in its own research and in gains already made in both coal- and oil-firing. A major contribution was the slag-tap furnace which permitted recovery of much of the ash in the furnace as slag. A more recent development, the Cyclone Furnace, allows only about 10 per cent of the ash to enter the gas stream. Used with simplified precipitators, it reduces fly-ash discharge to exceedingly small amounts. Improved oil burners also mean clean stacks. In addition, research on the application of additives to the fuel oil indicates marked reduction in formation of sulfur trioxide with corresponding reduction in discharge of corrosive acids and ash particles.

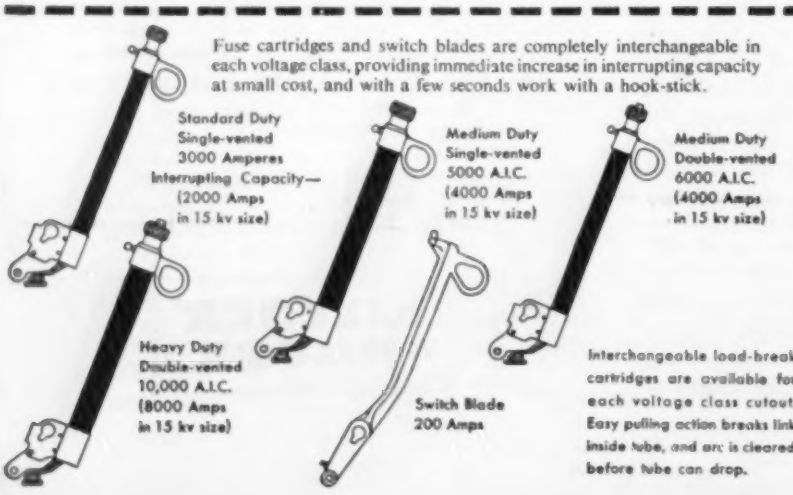
Many questions remain to be answered, and time and money must be spent to find economical solutions that will stand up in service. In B&W's completely equipped Research Center at Alliance, Ohio, complete pilot units are built and operated under field conditions in a full-scale effort to extend the knowledge of combustion methods, stack discharge, and steam generation. Developments such as the Cyclone Furnace, improved pulverized-coal firing, the Cyclone Steam Separator, materials for higher pressures and temperatures, and the Universal Pressure Steam Generator are some of the better known results of this unique program. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.


Bird-proof
Corrosion-resistant hardware
Direct connections cut number of current-interchange points
Silver-plated copper or brass current-carrying parts
High-pressure contacts
Tube cannot miss top contacts
Interchangeable tubes—all take standard 20-inch fuse links
Standard EEI-NEMA hanger; angle or vertical mounting
Bird-proof
Hook-stick removal and replacement
Shunt contact
Hinge anchor
Direct connections cut number of current-interchange points

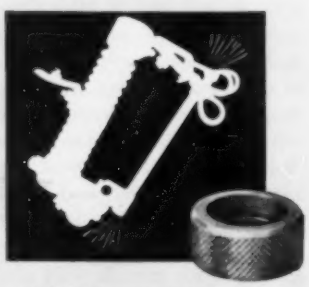
Standard mounting available in all three voltage classes. Top contacts and center hanger mounting are through-bolts with insulated heads. These keep the porcelain under compression, providing added strength and a completely bird-proof design.

On Low Amperage Faults single venting, at bottom only, provides ample pressure to expel the arc and the fuse link, before the tube drops down. In cases of low amperage faults, only the fuse link needs to be replaced. On high interrupting capacity cutouts, the expendable cap, above, right, remains intact, the same as the solid cap.

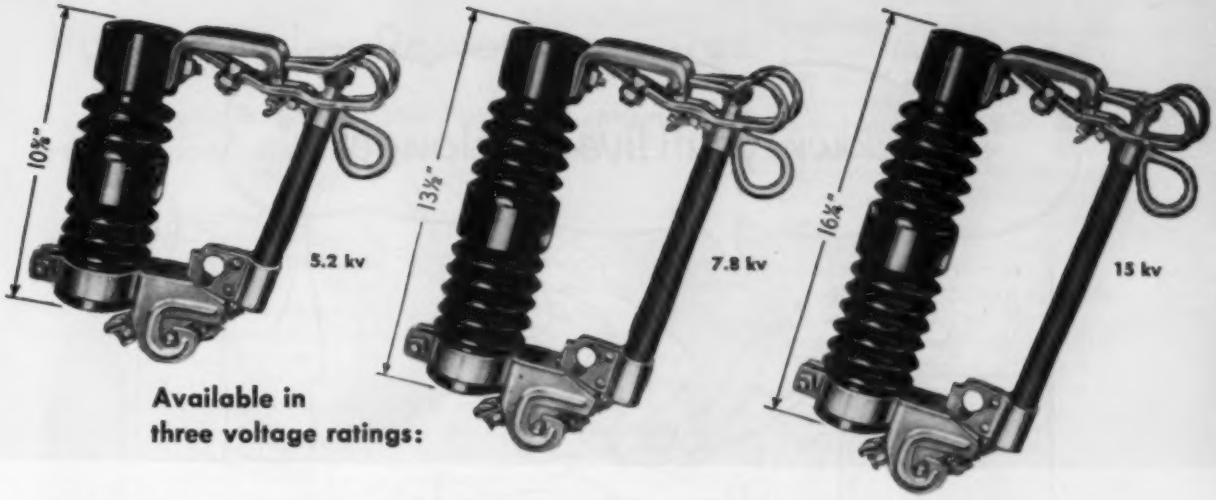
Fuse cartridges and switch blades are completely interchangeable in each voltage class, providing immediate increase in interrupting capacity at small cost, and with a few seconds work with a hook-stick.


Standard Duty Single-vented 3000 Amperes Interrupting Capacity—(2000 Amps in 15 kv size)
Medium Duty Single-vented 5000 A.I.C. (4000 Amps in 15 kv size)
Medium Duty Double-vented 6000 A.I.C. (4000 Amps in 15 kv size)
Heavy Duty Double-vented 10,000 A.I.C. (8000 Amps in 15 kv size)
Switch Blade 200 Amps

Interchangeable load-break cartridges are available for each voltage class cutout. Easy pulling action breaks link inside tube, and arc is cleared before tube can drop.



On High Amperage Faults pressure opens expendable cap at top. Tubes don't burst. No gas flashover, because no cutout parts are in path of gas discharge.



Available in three voltage ratings:

L-M's New "HDO" Open-Type Cutouts... The Cutout Development Of The Year!

New "HDO" 100-ampere cutouts are the simplest, most rugged, easiest to operate in the industry today. Provide high interrupting capacity, bird-proof design; heavy construction, assuring economy.

By R. W. KELLY
Application Engineer
Protective and Switching Equipment Division
Line Material Company

Here's a big new development in open-type cutouts that offers you a tremendous improvement in performance, operation, and economical long life.

The "HDO" is a big, rugged cutout. It is strong, durable. It's the easiest cutout to operate you ever saw. Complete hook-stick removal and replacement of cartridges. Bird-proof construction. Silvered current-carrying parts with few current-interchange points assure ample capacity without overheating. And it operates equally well on high and low fault currents.

Positive Pressure Control

A feature of the "HDO" is L-M's exclusive pressure-controlled expendable cap. On low faults the pressure is confined, assuring consistent, reliable arc interruption. On high faults the diaphragm in the cap opens, relieving the pressure by providing double venting.

Complete Line of Cutouts

Prices for the "HDO" cutouts are extremely reasonable, and the interchangeability feature offers desirable future economies. The complete line includes cutouts in the 5.2, 7.8, and 15 kv classes, with a full line of cartridges in standard- and heavy-duty interrupting ratings, and a 200-ampere switch blade. All cartridges take standard 20-inch distribution fuse links.

Protection That Is Reliable

The many desirable features incorporated in L-M's "HDO" open-type cutout assure positive action, dependable service.

Completely bird-proof construction.

Current-carrying parts all silver-plated brass or copper; this prevents false outages caused by contact heating even after many years of operation.

Cartridge firmly anchored for closing-in on faults; tube cannot move upward; cannot pop out of bottom hinges in closing.

All cartridges are designed for complete removal and replacement with a standard hook-stick.

Maximum interrupting capacities with any size link. Cutout interrupts any fault current from minimum melting of link to maximum cutout rating.

Connectors mounted directly on stationary contacts eliminate several current-interchange points.

Tube cannot miss top contacts, which are heavy silver-plated springs and designed to serve as a guide.

Corrosion-resistant, high-strength hardware has four to six times the life of mild steel.

Get Complete Information

Ask the LM Field Engineer for complete information about L-M's complete line of open and enclosed fuse cutouts and other protective equipment. Or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

SIZES AND RATINGS

Cartridges	Interrupting Capacity, Amperes 5.2 kv.	7.8 kv	15 kv
Standard Duty Single Venting (Solid Cap)	3000 A.	3000 A.	2000 A.
Medium Duty Single Venting (Solid Cap)	5000	5000	4000
Medium Duty Double Venting (Expendable Cap)	6000	6000	4000
Heavy Duty Double Venting (Expendable Cap)	10,000	10,000	8000
Switch Blade	200 amperes continuous		

All cartridges and switch blades interchangeable in each voltage class.

LINE MATERIAL
fuse cutouts and fuse links

204-R2

a slow speed meter will live longer too!

In these fast-moving times, it's almost standard practice for doctors to warn busy executives to slacken their pace. Perhaps your doctor has advised you to slow down. If he did you probably took his advice because, well—we all want to live longer.

* * *

Slow-speed watthour meters will live longer too—because slow-speed means less wear on moving parts. This is why the Sangamo J2 Watthour Meter with its 6. constant will last longer than an ordinary meter with a 3.6 constant. The J2 is *the* slow-speed meter. There's less wear on all moving parts.

How much slower is the J2 than other meters? A full 40% slower. The J2 makes 111.1 *fewer* revolutions to measure 1 kilowatt hour.

THE FIRST WATTHOUR METER WITH

STRAIGHT LINE ACCURACY UP TO 100 AMPERES

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

JM55-5

Politics Delay Power Measures

. . . in Congress as members plan Presidential campaign next year; Ike's partnership policy expected to be an issue

Power and water legislation is moving slowly in Congress. With the session better than two-thirds over, not one new power project authorization has become law. The Presidential election next year looms as a paramount factor behind the delay.

On all new and pending power proposals, the Administration is emphasizing its "partnership" approach wherein the federal government joins with regional utilities in building the project.

The Democrats have refused to endorse any partnership proposals to date and plan to make partnerships a campaign issue next year. They will charge that the partnership approach is a technique to slow down and stall off project development and will attempt to show that little or no power has been produced where projects have been turned into partnerships.

The Administration recently tossed a new partnership project into the backyard of Senate Interior Chairman James Murray of Montana. New-dealing Sen Murray, who opposes the partnership concept in favor of full federal construction, finds himself in the delicate situation of whether or not to oppose a partnership proposal for construction of the $220-million Yellowtail Dam on the Big Horn River in southeastern Montana.

Partnership for Yellowtail

Pacific Power & Light Co and Montana Power Co already have submitted their basic plan to the Interior Department and to Congress. Under Secretary of Interior Clarence Davis has notified the Senate Interior Committee that, if the details are worked out satisfactorily by the participating utilities, the Department will favor partnership rather than federal construction.

Three other partnership proposals, all formerly authorized as federal projects, are pending before Congress. These include the $310-million John Day Dam on the Columbia River, the $37-million Cougar Dam and the $58-million Green Peter Projects in Oregon. Democrats are dragging their feet on all three and their control of the committees almost assures that there will be no congressional approval this session.

The Administration's program on power and reclamation is moving slowly through Congress, while Democrats are pushing a program of their own, designed to at least provide issues for next year's political campaign if they fail to get congressional approval.

The Administration's great natural resources project, the $1.5-billion Upper Colorado River Storage Project, has passed the Senate and now is before the House Interior Committee, where an effort will be made to restore some of the projects knocked out by the Senate. Proponents will almost certainly be forced to give up the controversial Echo Park Project, so bitterly fought by conservationists and southern Californians.

The other project bearing the Administration's stamp of approval is the $156-million Fryingpan-Arkansas water diversion project in Colorado, which has been reported by the Senate Interior Committee. It faces its toughest battle in the House where it was turned down during the last session.

The Democrats are putting their big push behind legislation to authorize the controversial Hells Canyon Project on the Snake River. A Senate interior subcommittee has viewed favorably a bill sponsored by some 30 Democratic senators calling for federal construction of a single dam on the Hells Canyon stretch of the Snake River between Idaho and Oregon.

Regionally sponsored legislation, such as the $225-million Trinity River Project in northern California and the Washita Basin Project, a $40-million flood control and municipal water project in Oklahoma, have received committee approval.

VEPCo Plans New Plant

Plans to build a power station on the York River, near Yorktown, to utilize by-product fuels from the new American Oil Co refinery have been announced by Virginia Electric & Power Co. The $20-million station is the result of negotiations between the two companies. First unit to be installed will be a steam turbine generator with 160,000 kw capability. Fuel will be petroleum coke and refinery gas to be obtained from American Oil's nearby refinery.

OG&E Doubles Mustang Station Output

Installation of a 110,000-kw turbo-generator by Oklahoma Gas & Electric Co has doubled generating capability of the utility's Mustang Station—already top producer in the OG&E system. Aerial view of the station, located near Oklahoma City, is shown above. The new addition upped Mustang capability from 109,000 to 219,000 kw.

DIGGER-LINE TRUCK COMBINATION, along with specialized crew, improves construction efficiency. Photo shows digger pulling an extra load of poles. On the job the line truck pulls the digger in and out of the more difficult positions

Special Crew Speeds Line Building

New and rebuild work on both distribution and pole-line transmission lines is handled by seven men with line truck and digger. Six crews are kept busy

JOHN L. STRONG, Electrical Foreman,

D. E. ROGERS, Assistant Electrical Engineer, Santa Cruz District, Coast Counties Gas & Electric Co*, Santa Cruz, Calif.

Specialization by one crew on the first phase of pole-line construction—hole digging and pole setting—is a key factor in improving construction efficiency. Under the method devised by Coast Counties Gas & Electric Co, a crew of seven with a digger and line truck set practically all poles required in one district for new distribution lines or extensions and for replacements on both distribution and transmission lines.

Better Use of Equipment Obtained . . . By doing one part of the job only, the crew leader and crew become more adept in setting poles, particularly in difficult situations. And the scheme has shown the way to better use of hole-digging equipment. The digger can be worked with the crew or out ahead of it as conditions warrant. For example, as the work slacks off on the first job, the digger can put down anchor holes or go on to dig holes at the next location.

The digger can pull a load of poles to the job on the way out from the operating center, saving a trip for the pole-setting crew. In hilly country or on muddy roads the digger can go in where the line truck cannot. If necessary, the digger can be pulled in with a properly blocked winch line from the line truck.

Inefficient use is eliminated as the digger no longer needs to keep up with several crews scattered over the district. Under the specialized method, the digger works just ahead of the pole-setting crew on every job. Seldom must pole holes be left open over night. A potential public hazard and need for warning flares are thus eliminated.

Scheduling first phase of pole-line work has been simplified. A clerk can schedule jobs on the basis of number of poles to be set, distance to the first job, and distance between jobs. Frequently work can be scheduled to take better advantage of weather or crop conditions, and poles can be set well in advance of the construction deadline. No adverse reaction has been experienced to poles being set ahead of time and left temporarily.

Crew Meets the Need . . . The specialized crew grew out of the needs of the Santa Cruz district of Coast Counties. There are very few long distribution line extensions to be built, and thus far there have been no large-scale housing developments. New transmission construction on a major scale is contracted out. Most new poles set are replacements in existing lines. In general, poles cannot be framed on the ground but must be snaked through overhead lines or trees and then completed. Thus a method was needed that would fit into the normal routine of distribution line rebuilding and take care of maintenance as well as some small amount of extension work.

Work of the specialized crew covers the normal routine plus pole-line transmission rebuilds and short sections of new transmission pole-line construction. The crew works within a radius of about 20 miles of the Santa Cruz operating center. Before a pole is set, it is gained and holes are drilled as required for steps, bolts, etc. Steps and ground rods also are

*Coast Counties Gas & Electric Co now is the Coast Counties District, San Jose Division, and Hollister District, Coast Valleys Division of Pacific Gas & Electric Co. The methods described were developed and in use before the merger of the companies.

installed. After the pole has been set, it is tamped and identified with a tag. Another crew handles the stringing of conductor and connecting the new lines.

The type of job and work schedules of other crews, however, may make it desirable for the special crew to complete pole replacement. It is equipped to cut out or switch the line, set the new pole, transfer the line and energize it, and pull the old pole. In practice, the digger-line truck combination keeps six other crews busy finishing the jobs thus started.

SPECIALIZED CREW sets pole with aid of hydraulic boom on line truck. Telephone circuit between head lineman and truck driver makes pole-handling safer

Four or Five Poles per Job . . . The usual job for the special crew runs four to five poles although a one-pole or a 20-pole job is not uncommon. Job locations may be scattered throughout the district. Normally, a dolly load of poles is taken out in the morning. If more are required, the digger will pull another load. Usually poles are spotted along the right-of-way before digging begins.

About half of the new line work in the district requires tree trimming. One advantage of setting poles well in advance of stringing is that tree-trimming crews can schedule trimming by areas. In addition, establishment of a right-of-way with a line of poles gives the crews a better idea of how to trim the surrounding trees.

Seven Men in the Crew . . . The specialized crew consists of five men on the line truck and two on the digger. In charge of the entire operation is the crew leader who works directly with two linemen and two groundmen. Operating the digger are the operator and helper. Linemen are in the crew because hot work or grounding of transmission lines sometimes is required. It would be time-consuming to get linemen from another crew and would disrupt both crews and prove costly. When only dead work is scheduled for the day, the linemen can be loaned to other crews working on the system.

Experience with the digger-line truck combination has turned up other unexpected advantages. As the digger crew usually is in close proximity of the pole-setting crew, full use of the seven-man crew can be made especially at difficult locations. With the digger on the spot, the crew leader can pick the most advantageous quarter when a pole is being replaced in a critical location.

AIR COMPRESSOR, rated at 36 cu ft, powers tools for breaking concrete, drilling holes, and driving ground rods. Water ejector and rotary planer may be added

Air Tools Are Used . . . To meet the needs of this specialized crew, special tools and equipment have been provided. The line truck has a hydraulically operated boom that normally will set poles up to 55 ft long. In the few instances in which larger poles are to be set, another truck is used.

Mounted on the rear of the regular truck is a 36-cu ft air compressor powered by a gas engine. This compressor powers a host of tools used to break concrete, drill and dig holes in rock, drill holes in poles, drive pole steps and ground rods, and tamp pole holes. Planned for the future is an air-driven water ejector for pumping out pole holes and an air-operated planer for speeding up the gaining of new poles.

The line truck has two pieces of communication equipment, a telephone and standard mobile radio to keep the crew in contact with the operating center for rescheduling or

MAXIMUM USEFULNESS is obtained from digger by having it work ahead of pole-setting crew. The unit digs anchor holes before moving on to the next job site

FINAL OPERATION is aligning and tamping of the pole. Another crew follows to string the conductor and generally complete distribution line construction

emergency calls. The telephone is an innovation that has more than proved its worth. The circuit operated from the truck battery is used between the crew leader and truck driver during the handling of poles and maneuvering of the truck.

This circuit consists of a standard hand pick-up for the crew leader and a head-set receiver for the driver connected by 50 ft of line. A 100-ft extension may be added when poles are being set some distance from the truck, as by a winch line blocked to another pole.

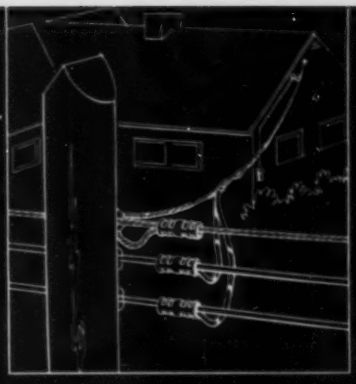
Phone Promotes Safety . . . Major benefit of the phone is enhancement of safety during pole setting. Positive and clear directions to the driver are to be desired over shouts and hand signals, particularly when setting a pole in an energized line. The crew leader then is required to stand on a rubber blanket or the back of the truck. With the movement of the truck under positive control, the rest of the crew goes about its work undisturbed by shouts and signals. Furthermore, there is no tendency on the part of the crew to help direct the work.

The telephone circuit has a definite public relations value in urban areas, for jobs can proceed without undue noise. Installed cost of the circuit on the truck was only about $100. Thought has been given to equipping the digger with a similar phone circuit.

Eliminates Wait for Other Crews . . . Another advantage of the special crew shows up in supplying the crew with materials for the day's work. With only one crew regularly using poles, other crews do not spend time waiting for poles. Because the special crew does practically all the pole setting with its hydraulic derrick, other crews load their stiff-leg derricks only when they are on a job requiring it. Elimination of the derrick means a lighter truck that can negotiate rough country a little easier.

Poles and anchors are loaded for the special crew by the storekeeper's helpers. Balance of material is loaded on pallets and placed conveniently on the loading dock. It has been found convenient and time-saving by the stores department to keep requisitions for poles and anchors separate from requests for other materials used by the special crew.

from pole to house entrance...



CORROSION FREE

Crimpit

COMPRESSION CONNECTIONS

Simplified hand or hydraulic installation tooling insures fast, fool-proof, economical connections with minimum investment in tools and dies. Write for Bulletin CR.

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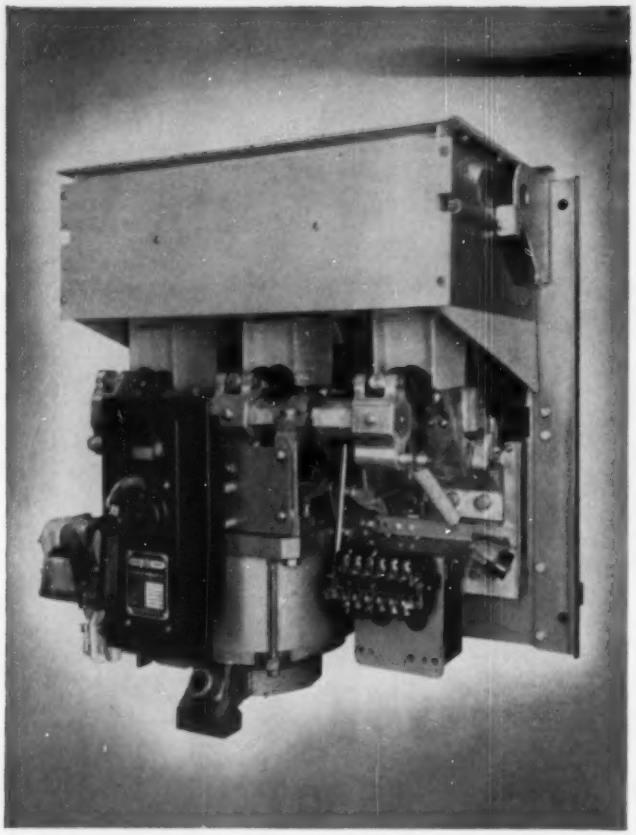
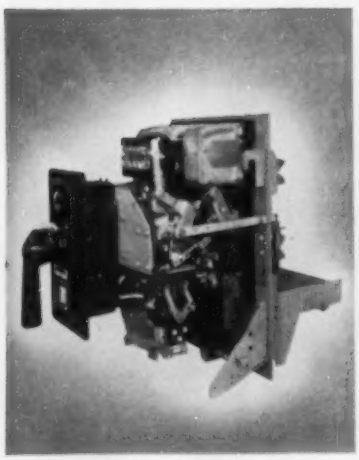
News of new developments in

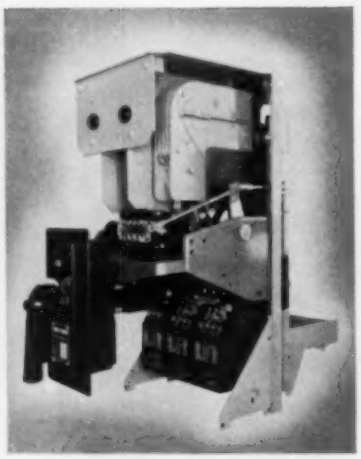


K line of circuit breakers now made through 3000 amp continuous, 75,000 amp interrupting at 600 v a-c

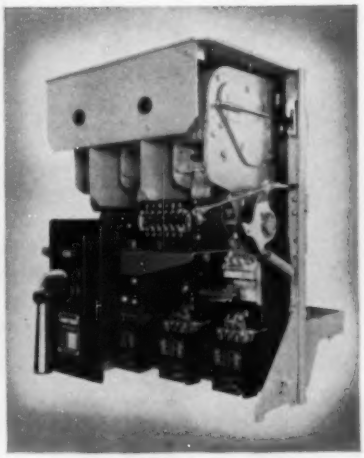
The new Type KD Air Circuit Breaker extends I-T-E's established three-high line of K breakers. It is an extremely compact metal panel breaker which incorporates the proved performance and generous safety factor of the KA, KB and KC breakers. As an integral part of I-T-E switchboard design, it offers the additional advantage of accessibility in minimum space.



KA Circuit Breaker



KB Circuit Breaker

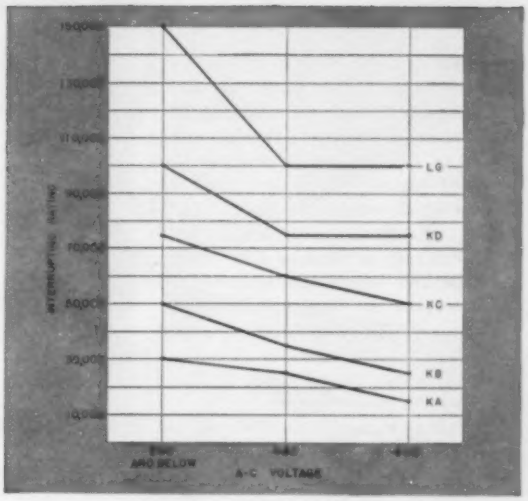


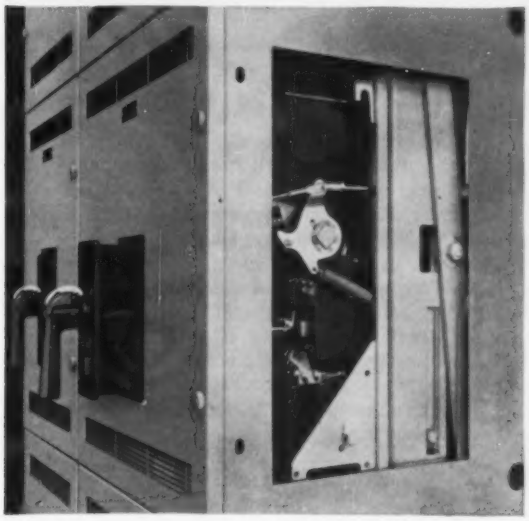
KC Circuit Breaker

I-T-E Low Voltage Switchgear

Circuit breaker interrupting ratings increased in keeping with proposed industry standards

You save, because these standards reduce switchgear costs by permitting the use of lower interrupting rating breakers for short circuit protection in 240 v a-c and 480 v a-c systems. And with smaller breakers you save space, too. Uprating of I-T-E Types KA, KB, KC, KD and LG Air Circuit Breakers is shown in the accompanying chart.





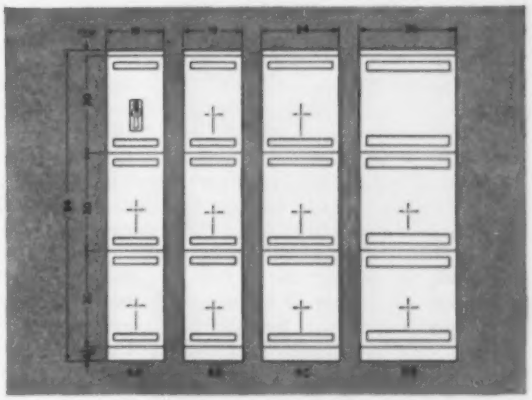
Test position with doors closed now standard on new switchgear

Test position with no increase in over-all switchgear depth! This facility is by far the most convenient, most compact design on the market. It is an exclusive with I-T-E Switchgear, yet it costs no more. Additional advantages are increased safety, reduced maintenance, improved cleanliness, easier circuit identification.

New compact breaker design saves space

All I-T-E Type K Circuit Breakers can now be assembled three-high. KA, KB and KC frame widths remain the same as before. However, the new KD breaker is 6 in. narrower than the old LG frame, and can be arranged in a three-high compartment, space being thus provided for instrumentation in the same frame.

For complete information, contact your nearest I-T-E field office. Or write I-T-E Circuit Breaker Company, 19th and Hamilton Sts., Phila. 30, Pa.



I-T-E CIRCUIT BREAKER COMPANY · Switchgear Division

Boulder City . . .

. . . should not be free of federal supervision, Hoover dam operators' attorneys testify

Attorneys for the two operators of Hoover Dam power plant—Southern California Edison Co and the Department of Water and Power for the City of Los Angeles,—have gone on record against bills pending in Congress which would free Boulder City, Nev., of federal supervision.

Testifying at Boulder City before House and Senate subcommittees of Committees on Interior and Insular Affairs, the attorneys declared that the bills, in present form, are illegal as well as unfair to the power allottees.

The identical measures—Senate bill 514 and House bill 2890—would allow Boulder City, established by the government when the dam was under construction, to be incorporated under Nevada state laws. The government would turn over to the municipality its share of power reserved from Hoover Dam power plant, a maximum of 20,000 kw.

Power Transfer Problems

Both John B. Matthews, attorney for W & P, and Bruce Renwick, vice president and general counsel of Southern California Edison, said such a transfer of power rights would be illegal, and implied that if Boulder City were incorporated it might find itself without electric power.

While the power used by Boulder City at present is relatively small—about 44 million kwhr this year—it could be expected to increase substantially if the city were incorporated, the utility spokesmen said. This would cut back allocations to Southern California Edison and Los Angeles W&P.

Renwick said it would not be unrealistic to consider the 20,000 kw at unity load factor, if business and industry move into Boulder City. Power consumption could then amount to some 175 million kwhr yearly.

Sen Alan Bible (D-Nev.) is chairman of the Senate subcommittee. Other members are Senators George W. Malone (R-Nev.) and W. Kerr Scott (D-N.C.). The House group includes Representatives Clifton Young (R-Nev.), Stewart L. Udall (D-Ariz.), and John J. Rhodes (R-Ariz.).

Matthews reminded the subcommittees that because of low water level in Lake Mead, the power allottees cut back Hover firm power 12% last fall, and contemplate a cut of more than 30% in 1955-56. The U. S., in its use of power for Boulder City, does not share in these cutbacks.

"While it may be appropriate tha: the government should occupy a preferred position with respect to such burdens which will continue to occur from time to time in the operations at Hoover Dam power plant, it does not appear equitable, nor was it contemplated, that the government should pass this advantage on to an incorporated city," Matthews said.

Both Senator Bible and Representative Young disagreed with the attorneys for the allottees, and indicated they would seek a legal ruling and fight to get power for Boulder City.

Labor Hassel Ends with 4% Wage Hike

An agreement boosting wages about 4% has been signed by Consumers Power Co and Utility Workers Union of America to settle a dispute deadlocked since February. Following recommendations of a panel appointed by Michigan's governor, employees were granted improved working conditions and fringe benefits as well as the 7-9¢ per hour wage hike.

Shown above after signing the agreement are (seated) G. W. Sanders, president, Michigan State Utility Workers Council; J. A. Fisher, president, UWUA; H. S. Richmond, vice president, Consumers Power Co; (standing) T. Terry and H. A. Thoma, both UWUA state vice presidents; C. Lewis, UWUA national representative; and R. P. Cranson, state labor mediator.

Vice president Richmond said that the settlement "will amount to more than $2 million (a year) . . . a very substantial rise in one of the major expense items affecting the company's electric and gas rates."

Alabama Utility Tax Bill Opposed in State House

A proposed 2 mill per kwhr tax on electric utilities has been opposed unanimously in the Alabama legislature by the House Ways and Means Committee which postponed consideration of the bill until after the current session.

Walter Bouldin, executive vice president of Alabama Power Co, stated that "investment analysts are fully aware the company could not absorb such a tax without raising rates. . . ."

"The pendency of the bill, therefore, may well have adversely affected the sale of $15 million of bonds by Alabama Power Co . . . and adversely affected the flow of capital which is so essential to the development of the state," he added.

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BLACKBURN *Aluminum* SERVICE WEDGE CLAMPS

W2-0A—For 2 solid or 4 ACSR to 1/0 ACSR. Standard Stainless Steel Ball
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BLACKBURN W2-0A
BLACKBURN W6-4A

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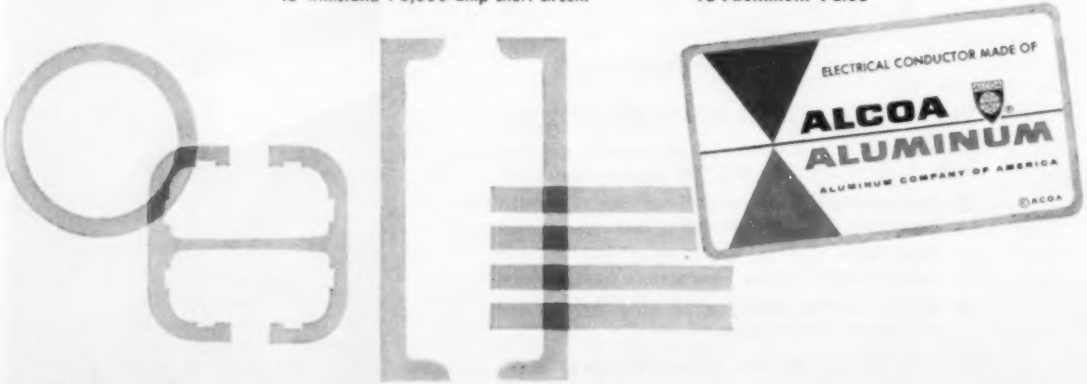
Alcoa Aluminum in a 480-volt switchgear unit. Main bus rated 1,600 amps and braced to withstand 75,000-amp short circuit.

Here is a recent switchgear application of Alcoa Aluminum Bus Conductors. Earlier Alcoa Aluminum Bus Conductor installations of this type are still in operation after thirty years of heavy-duty service in electrochemical plants, steel mills and public utilities.

Alcoa offers shapes, alloys and tempers designed to meet even the most specialized mechanical and electrical requirements, giving you significant savings in material and installation costs. Whatever your installation or bus design problem is, there's an Alcoa Aluminum Bus Conductor so right for the job it's almost custom fabricated.

Let us help you with your design to get the most out of the many types of Alcoa Aluminum Bus Conductors available. If you'd like to see what you can expect of this modern electrical metal, ask your local Alcoa sales office for a copy of *Service Records of Alcoa Aluminum Bus Conductor Installations*. Or write Aluminum Company of America, 2306-F Alcoa Building, Mellon Square, Pittsburgh 19, Pennsylvania.

Your Guide To Aluminum Value



ALWAYS USE ALCOA ALUMINUM ACCESSORIES WITH ALUMINUM CONDUCTORS

E. J. BATES SCREENS A SHOT OF STUDEBAKER'S LONG-CYCLE RADIANT OVEN TO POINT UP A 500-KW INSTALLATION

AIEE Conference Told . . .

Industry Profits from Electric Heating

- **New brazing method yields high, accurate heat fast.**
- **Salt baths can be watered. Metal cools faster if salt is pumped downward.**
- **Quarts infrareds simulate heat barrier for airplanes.**
- **Weddings of high and low induction frequencies can slash costs 20%.**

Aluminum and magnesium alloys can be brazed quickly and economically now with closely controlled temperatures, despite disconsolate experiences of the past.

A unique heat source has solved the problem of overheating. Wallace C. Rudd, vice-president, New Rochelle Tool Corp, told the AIEE heating conference in Chicago, May 10-11, that his company's newly-developed equipment controls temperatures closely yet releases great waves of heat in seconds.

Heat trickles into a sump but comes out fast from a circulating liquid piped to blocks of Inconel or other suitable heat-conducting metal. These blocks clamp the work pieces lightly between them. They reach "perfect temperatures" promptly, and overheating—which may melt the parts themselves—is impossible.

The liquid is heated in the sump by elements totaling 25 or 50 kw. Thermostats control the temperature to an accuracy of about 5 degrees. The sump is well-insulated, and once the liquid reaches this perfect temperature, power demands drop sharply.

On 16-gauge aluminum, the braze takes less than 30 sec. Straight lapped joints in ½-in. sheet aluminum 50 ft long have required less than a minute. Tricky tube-to-sheet brazes also pose few problems, and resistance heaters have been brazed to ten coffee pot bottoms in 60 sec.

A 50-kw unit costs about one-fourth as much as a controlled furnace and occupies only 36 sq ft of floor space. Heating can be selective, thus more economical, if the heat-transfer blocks can be designed to touch only the portion to be brazed. Unskilled labor can turn out highly complicated joints, and the unit will work in production lines. Compared with torch brazing, rejects are reduced "immeasureably" because overheating is eliminated.

Watering Salt Baths

Metal cools faster in salt quenches if the salt is pumped downward instead of upward, reported L. B. Rosseau, vice-president, Ajax Electric Co. In one case, cooling time was halved. More rapid chilling occur regardless of pump speed and quenching medium.

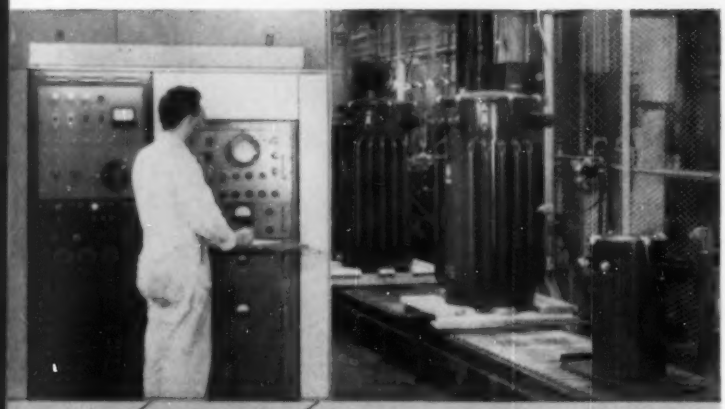
Furthermore, mixing water with nitrate quenching salts yields a "definite pickup" in workpiece hardness—often at higher quench temperatures. This was confirmed in a study which also revealed:

- Large amounts of water can be added safely to nitrate salts at 700F.

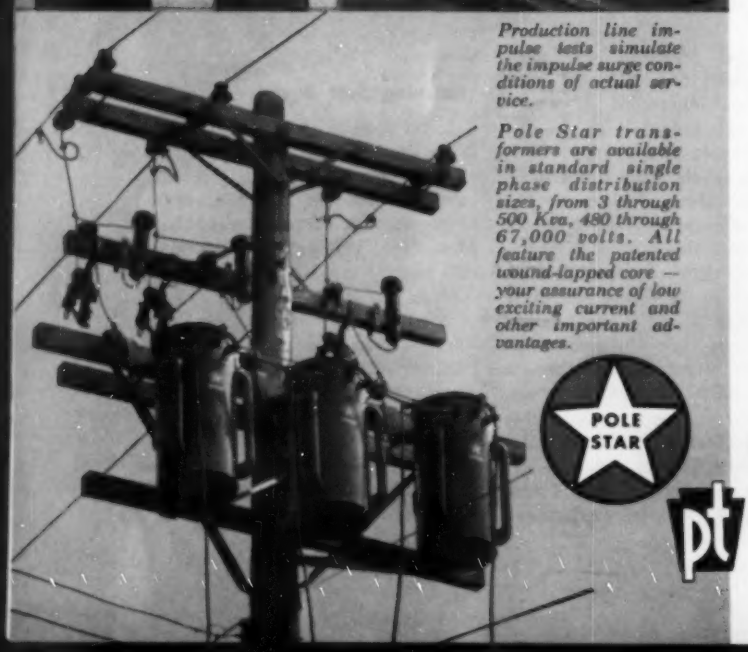
(*Continued on page* 27)

"You're wastin' your time, Doc...

those Pole Star transformers were all IMPULSE TESTED at the factory!"



Production line impulse tests simulate the impulse surge conditions of actual service.



Pole Star transformers are available in standard single phase distribution sizes, from 3 through 500 Kva, 480 through 67,000 volts. All feature the patented wound-lapped core — your assurance of low exciting current and other important advantages.

POLE STAR

pt

The man is right, Doc! And you can bet your stethescope those Pole Stars are right, too. You see, Pennsylvania's production line impulse testing — standard procedure for all units from 3 through 100 Kva, 18 Kv and below — makes certain that Pole Star transformers are just as dependable as the name implies.

At Pennsylvania, impulse testing is performed after the units have passed all required ASA and NEMA tests. Transformers are tested *without arresters* — being subjected to impulse voltages that are higher than the basic impulse insulation levels required by ASA and NEMA standards. Since tests are made between layers and turns as well as to ground, these production line tests simulate the impulse surge conditions likely to occur throughout the entire transformer during actual service.

The apparatus used for detecting failures during these tests is so sensitive that it will disclose *even* a one-turn high voltage short circuit. Such rigid quality control means added years of trouble-free service with Pole Stars, and important reductions in maintenance.

Distribution Sales Department

Pennsylvania Transformer Company

A McGraw Electric Company Division

CANONSBURG, PA. • ***Greater Pittsburgh District***

BRAZED EXHAUST HEATER from a Model A Ford attracts Leo Grant and Dean Randolph, Toledo Edison Power Sales Dept

ATOMIC DINNER entertainment came from Dr Hubert Alyea, Princeton University, who made own fireballs from flour

AIEE Group Hears How Industry Can Harness New Ideas

(*Continued from page* 25)

• Although readily absorbed, this water will boil off in several hours.

• A 1% water content distinctly improves the salt's cooling power.

• When the bath bubbles too much during the quench, it's too watered-down.

Airplanes and Bacon

New quartz infrared lamps, which can yield up to 80 kw per sq ft and temperatures of 3,000F, are being used in banks to simulate the temperature rise a plane would encounter at 10 times the speed of sound, reported E. J. Bates, electrical engineer for National Cash Register Co.

Lamps are closely spaced—often on ½-in. centers. Two banks sometimes are used, one bank staggered behind the other. To intensify heat output, engineers usually operate them at triple rated voltage, but just for a few seconds.

Cured bacon, formerly produced in 30 hr, now is being turned out in 30 min by radiant heat. Production is 1,500 lb per hr, and superior bacon emerges from between radiant panels spaced 27 in. apart. Smoke is deposited electronically, and the total power cost is 0.1¢ per lb of cured meat.

Model Heat

If you want a preview of how a big induction unit will work, make a model of it. Scale electrical-model testing is feasible even when such intangibles as magnetism and frequencies are involved, said Robert M. Baker, advisory engineer at Westinghouse Electric Corp's Electronics Div in Baltimore.

When the scale model has been made electrically analogous to the big unit, thermal conditions in the load also are analogous. Only radiation losses fail to correspond proportionately. These scale models should be about quarter-size, not minuscule.

Essentially, here's how to do it: Reduce linear dimensions of load and coil in the ratio "R". Keep coil turns and applied voltage the same. Boost frequency in the ratio of $1/R^2$. Your resulting model gives the same power factor and efficiency; proportionately reduced power input, coil loss, and power-into-work; same heating patterns.

Teaming the Cycles

Although high frequency induction heat reached industrial maturity earlier, 60-cycle induction heating is now coming of age. The two are more frequently teamed these days yielding these benefits:

• Up to 20 savings in initial investment.

• Relatively high production rates.

But C. A. Tudbury, engineering manager, Ohio Crankshaft Co's Tocco Div, pointed out that engineers, should know these pitfalls: First, parts usually are not interchangeable between units. Second, the tandem arrangement must be shut down completely when one partner develops trouble.

The 60-cycle half might foster plant load unbalance, particularly if the high-frequency unit requires 3-phase power. But this can be averted by operating other units simultaneously on other phases or by splitting the 60-cycle coil into three parts.

Naturally, the more control required to govern final billet temperature, or to regulate voltage fluctuations, the less the savings will be.

In this type of installation the 60-cycle half usually brings the 2-to-9-in.-dia workpiece up to an intermediate temperature. The high-frequency unit finishes the job.

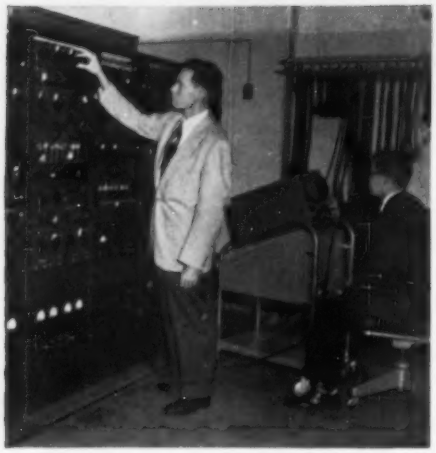
The Scorched Question Mark

High frequency resistance heating can be somewhat selectively controlled in a work piece by a nearby magnetic field. To dramatize his point, Hugh J. Cameron, New Rochelle Tool Corp, screened a color slide showing what appeared to be a red-hot question mark. Actually, it was the path current took through a metal plate to get from one electrode to the other. The return conductor was shaped like a question mark and rested just above the workpiece.

The depth of current flow in such cases depends upon how near the return conductor is to the workpiece. The scorched question mark was cherry red where the wire nearly touched it, but was dull red otherwise.

SWITCHGEAR NEWS

NEWS OF SWITCHGEAR DEVELOPMENTS OF IMPORTANCE TO THE ELECTRICAL INDUSTRY



New Analog Computer Aids G-E Switchgear Research

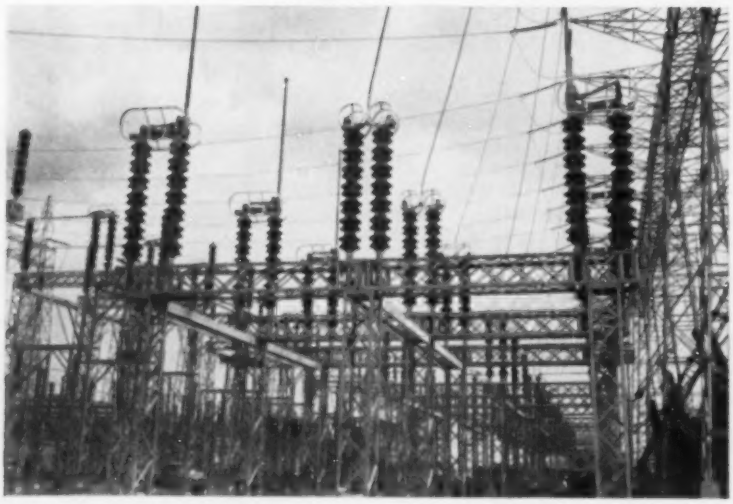
During its first year of operation the analog computer has proved to be an extremely useful tool in speeding General Electric switchgear research. Its primary function is to investigate the performance of a wide variety of mechanical systems used in G-E switchgear products. In addition to saving a great deal of time, the new computer has given G-E designers vital data unobtainable by other methods.

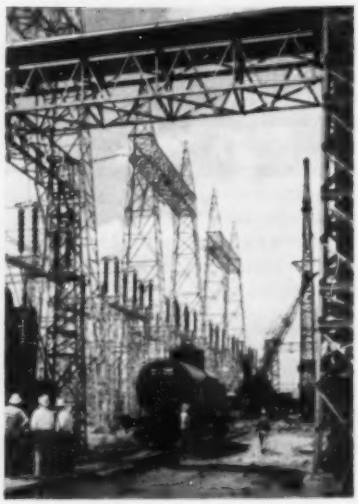
Among the important contributions made by the new computer was the verification of the design of the new high-speed distribution breaker described on the next page.

Many other problems are now under consideration which will ultimately result in improved switchgear performance. Among them is investigation of the contact bounce phenomena in the cup-type relay. Results of this study should make it possible to increase contact efficiency and life.

G.E.'s speeded-up research program has resulted in increasingly complex problems being handed to the computer. To keep up with this increasing load, new additions have been made to the original installation, until today, the computer, with a total of 12 integrators, is able to represent a six-degree-of-freedom system.

Nation's largest switchyards near completion





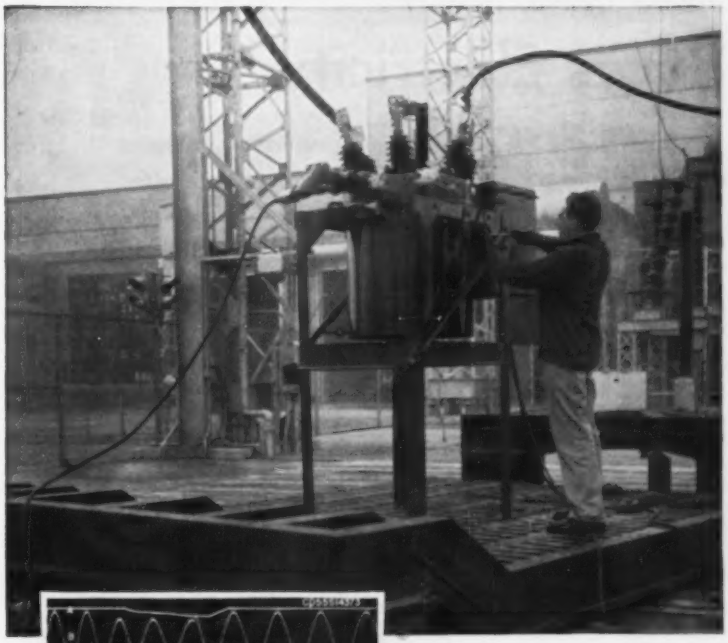
Two of the largest and highest voltage outdoor substations ever built, rated at 1,000,000 and 1,300,000 kva, each including approximately 800 tons of steel and covering approximately 13 acres, are now under construction for an important AEC project. The switching structures of the 330-kv substations were designed and furnished by the General Electric Company's High Voltage Switchgear Department at Philadelphia. They will be used for switching the large amounts of power required for a new installation.

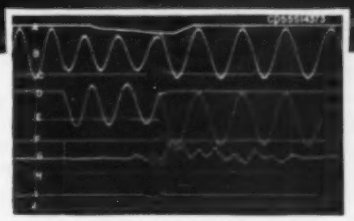
The stations utilize a total of 114 air switches rated 330 kv, along with a number of the new 25,000,000 kva interrupting capacity power circuit breakers. Aluminum buses are used throughout the stations and designed to carry a continuous current of as much as 2000 amps. More than 4000 strain insulators and 6000 bus and switch insulators were required for each station.

General Electric announces . . .

NEW 5-cycle distribution breaker

High-speed Interruption Minimizes Chance of Line Burn-down, Offers Closer Co-ordination of Fuses





New breaker has been subjected to extensive full scale power and capacitance switching tests at G-E Development Laboratory. Oscillograms consistently show better than 5-cycle interruption.

A new oil power circuit breaker for distribution system application is now in production at General Electric's High Voltage Switchgear plant in Philadelphia.

Rated to interrupt distribution loads in 5 cycles at 14.4 kv, the new breaker offers distribution engineers the opportunity of increasing transformer sizes to meet load growth without need for changing to a heavier wire system.

On systems using 1/0 wire, for example, the new breaker would permit transformer capacities to be increased 68% over burn-down values considered safe for the standard 8-cycle breakers now in use. Faster interruption will also enable better fuse protection of distribution equipment because smaller ratings of co-ordinated fuses may be applied.

To achieve smooth, positive closing, G-E engineers teamed a stored-energy torsion spring with a low-impact cam-drive mechanism. The mechanism is both mechanically and electrically trip-free and can provide instantaneous initial reclosing even if closing power supply is unavailable.

Powered by a 400-watt universal motor, the spring charged mechanism eliminates the need for heavy closing power supply sources normally required with distribution breakers.

The new, stronger cylindrical tank breaker requires 26% less station space than did the previous square tank breakers. Six bayonet type interrupters are incorporated in the single-tank construction.

The higher-speed 5-cycle breaker supersedes G.E.'s 8-cycle Type FLO breaker and is being introduced at no increase in price.

For further information, see your General Electric representative, or complete the bulletin-request coupon on this page.

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☐GEA-5961 Impulse Oil Circuit Breakers (138-300-kv)

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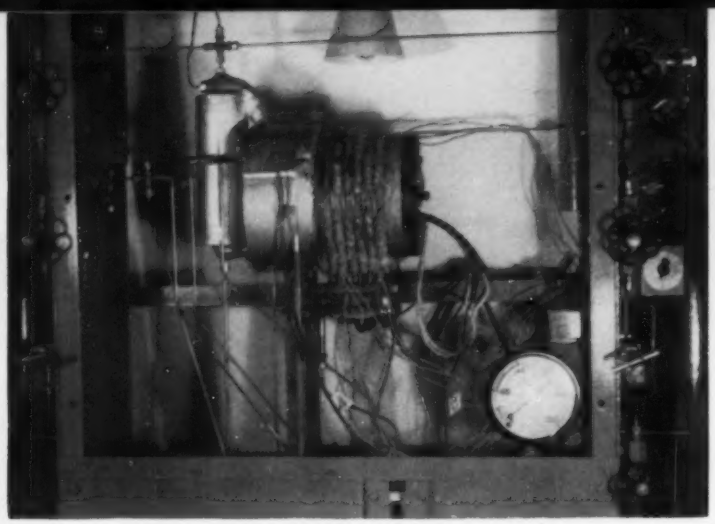


Fuel Cell Produces Electricity

Oxygen-hydrogen fuel cell developed at Cambridge University produces electricity directly at 65% efficiency. Power and transit groups interested

Plans are being made for a prototype oxygen-hydrogen fuel cell with a minimum rated output of two-to-three kw and a "guaranteed" life of over 1,000 hr. Using hydrogen and oxygen and exhausting water, it will produce electricity directly with no intermediate boilers, turbines, or generators.

Development of reliable, highly-flexible portable power sources for Britain's electric trains might be the first result of F. T. Bacon's research at Cambridge University's Department of Chemical Engineering. His work is financed by the British Electrical and Allied Industries Research Association (ERA) and the Ministry of Fuel and Power.

Considerable amount of time, money, and effort is being devoted to fuel cell research in Britain. Low and high pressure hydrogen, redox, and high temperature cells are currently being studied.

Power Industry Interested . . . The Central Electric Authority, which operates Britain's nationalized power industry, is financing its own fuel cell research, concentrating primarily on redox and high temperature types. Because virtually all of its power comes from coal, CEA would rather have fuel cells capable of operating on materials readily extracted from coal. Bacon's cell at present requires gases of high purity. However CEA is reserving final decision until it sees a prototype in operation. It has noted Bacon's proof that long-life can be built into his cell and that a system of O-H cells might be used successfully with its proposed wind generators.

British Transport Commission (in charge of the nationalized railways) could use fuel cells to equalize rush-hour demand in slack periods and extend the range of its electric trains beyond limits of high-tension transmission. Oxygen and hydrogen electrolyzed from water during off-load hours could be bottled under pressure and then loaded on engines equipped to produce their own power or centrally stored for future use at a generating plant.

Squat Cylinder . . . The unit now in operation was designed by Bacon and T. M. Fry (now with Britain's Atomic Energy Establishment at Harwell). It has the over-all appearance of a short squat cylinder. The two external halves of the cell are steel, nickel-plated on their inner surfaces. They are circular and held together by insulated bolts. Standard high pressure steam pipe joints are used. These joints also act as insulators between the two electrodes.

Internal diameter of the cell is 5 in. Inside the two halves and centered between them are two circular porous nickel electrodes 5/32 in. thick and 1/16 in. apart. Basic pore size of the electrodes is 30 microns, though the inner (facing) surfaces are coated with porous nickel having a maximum pore size of 16 microns. A 27% potassium hydroxide (KOH) aqueous electrolyte circulates through the gap between the electrodes. The gases circulate—oxygen on the plus side, hydrogen on the negative side—in the two spaces between the electrodes and the nickel-plated steel ends of the cell. The electrodes are made by sintering nickel powder.

The cell operates at 284-464 F (140-240 C) and 600-800 psi. A small positive pressure of about 1.5 psi is maintained in the gas chambers in order to prevent the electrolyte from entering the electrodes any further than the thin layer of small pores. Pressure is adjusted so that it stops the electrolyte from penetrating but not so great that it forces the gases to bubble through the small pores into the electrolyte. This pressure differential obviates the need for a diaphragm between the electrodes. The 30 micron pore size allows a greater gas absorption surface. The essential reaction takes place along the thin surface where gas and electrolyte are just in contact.

Pressure differential is maintained by readings from two water-level

gages. Thermal syphon circulates the electrolyte. Water vapor is condensed and removed periodically from the gas lines. Single cell operating at 30 amp produces about 10 milliliters of water per hr. Facilities exist for keeping the strength of the electrolyte constant. Except for electrolyte lines, all piping runs cold. Thermostatically controlled externally mounted electric coil heaters maintain the cell at constant temperature.

Operation . . . The chemistry of the operation is relatively simple. A thin layer of nickel oxide is quickly formed on the oxygen electrode. This absorbs and activates molecular oxygen which combines with the water present in the electrolyte to form two OH^- ions. Extra electrons are picked up from the oxygen electrode so that:

$$O_2 + 2H_2O + 4e = 4OH$$

The hydroxyl ions then travel through the electrolyte to the negative electrode where they combine with molecular hydrogen giving up their extra electrons and forming water:

$$2O + H_2 = 2H_2O + 2e$$

This establishes the electromotive force between the negatively charged hydrogen electrode and the positively charged oxygen electrode. Equalization of this potential difference occurs as an electron flows from the hydrogen to the oxygen electrode via whatever circuit is attached.

The theoretical voltage possible is equal to the free energy of the reaction per gram-mole of water formed at the temperature and pressure used divided by 2F, where F is a faraday or 96,500 coulombs. This theoretical maximum decreases as temperature rises and increases with pressure.

So far no trouble with the cell has been experienced except in the jointing. This tends to deteriorate under the action of the oxygen and the electrolyte. However Bacon believes he has found a joint packing material which will meet the operating requirements of the cell.

Efficiency of 65% . . . Laboratory model has now run over 1,000 hr, one third of the time on load and the rest on open circuit at operating temperature, at a general efficiency of 65% (based on the free energy of reaction). Previously, fuel cells operating at any kind of reasonable efficiency had short lives due to rapid deterioration of the electrodes. The unit produces 90% of the maximum theoretical voltage of 1.2 v on open circuit. Efficiency drops to 50% under severe overloads. Overload conditions, however, appear to have no deleterious effect on the life of the cell.

A typical specific rating of the cell is 65% efficiency at 0.8 v and a current density of 0.41 amp per square centimeter; or for the unit as a whole, 0.8 v and 58.9 amp (47.2 w). However to attain long life (at 65% efficiency and 0.8 v) the current density must be decreased to 0.24 amp per square centimeter or 25 amp for the cell as a whole 20 w). Operating temperature in the first case is 464F (240 C), in the second 392 F (200 C).

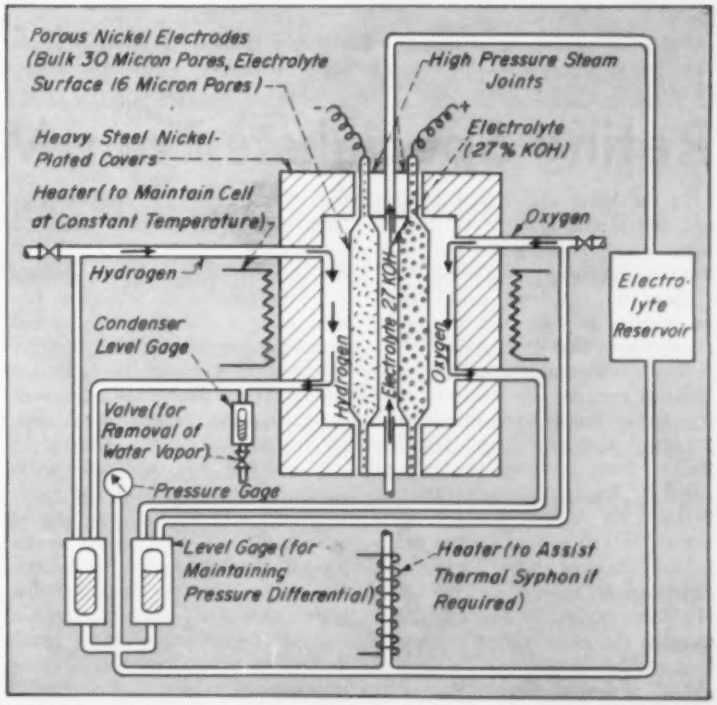
Six cells have been run in series raising the voltage to 4.8 v at the same amperage. This series arrangement presented no special problems, and there is no practical reason why the total number of cells in series cannot be raised to 100 or more.

The current capacity of the cell can be increased by enlarging the unit's diameter. The laboratory models have a 5-in. inside diameter. For the prototype, Bacon is thinking in terms of 10 in., thus raising the cell's amperage by a factor of four (current density is a factor of design and would remain constant). Voltage increases as the number of cells in series is raised. A 100-cell unit with 10-in. cells and a current of about 100 amp at 392 F (200 C) and 0.8 v would probably have a capacity of 8 kw.

Advantages . . . The most obvious advantage of the O-H cell is its weight. The weight of an O-H cell including the necessary gas cylinders, would be about 50 lb per kwhr of energy to be stored.

The O-H cell also offers the advantage of complete flexibility in the amount of power that can be stored. Fuel cells, however have no storage capacity, but will continue to deliver power as long as there is gas under pressure available.

Taking into account over-all efficiency—that of electrolyzers needed to produce hydrogen and oxygen originally and the final efficiency of the fuel cells—Bacon figures a typical traction unit would have an efficiency of 40%, assuming no major improvements in the present cell or in the standard electrolyzers.



HYDROXYL IONS formed at O_2 electrode move to H_2 electrode and combine with hydrogen to form water and free electrons and thus produce electromotive force

EXAMINING Aluminum Co of America installation at Bauxite, Ark., are (l to r) J. O. Ready, Fenton Brown, J. J. Duggan, Paul Hallingby, Jr, John Becker, and P. E. McChesney of the host company, Arkansas P&L. Tour lasted full week

Rating Specialists Tour Mid-South

In the belief that rating agencies and others need much more than financial and operating statistics to do their job effectively, Middle South Utilities, Inc, last month took a group of financial analysts from the rating services on a tour of its system.

The party consisted of John J. Duggan, assistant vice president, Savings Banks Trust Co; Fenton Brown, Standard & Poor's Corp; John G. Becker, Fitch Investors Service; and John O. Ready, Moody's Investors Service. The Savings Banks Trust is adviser to 130 mutual savings banks in the State of New York. Paul Hallingby, Jr, assistant to Pres Edgar H. Dixon of Middle South Utilities, escorted the party during the week-long trip.

Middle South officials state that they have found that analyzing and rating first mortgage bonds and other utilities securities calls for intimate knowledge of the territory served by a utility. In addition to financial and operating statistics, these agencies give consideration to "intangible factors" such as the characteristics and economic potential of the territory served, the regulatory climate, the attitude of the people toward attracting capital and industry to the territory on a sound basis, and so on.

It was felt that the best way to familiarize the investment and rating specialists with such factors was to take them on a tour of the service areas of the companies in the system. This is probably the first time that such a tour of an electric system has been conducted purely for a group that is primarily interested in rating securities.

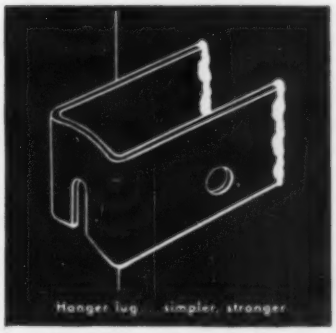
The tour was conducted on a fast-moving, hard-working basis and proved highly profitable to both the guests and the Middle South system. The visitors were able to become better acquainted with important segments of the territory, with officers of the system companies, and to meet and talk with local business, civic, and government leaders.

Middle South made no special effort to show the guests their power plants and other physical properties, although a brief tour through one of the modern, outdoor generating stations of the system was included.

The party was flown to Little Rock, Ark. From there they were taken by automobile through the territory of Arkansas Power & Light Co. Subsequently they saw the territories of Louisiana Power & Light Co, Mississippi Power & Light Co, and New Orleans Public Service Co, by both car and plane.

Jim Donald, Distribution Transformer Product Engineer, calls your attention to this

FACT: New hanger lug construction eliminates corrosion, increases strength 39%



The new hanger lug construction on Westinghouse pole-type distribution transformers is simplicity itself, and 39% stronger than ever before. Still meeting EEI-NEMA Standards, lugs have straight sides which are scalloped and flash-projection-welded directly to the tank wall. This results in a continuous weld so that crevices and moisture traps are eliminated.

Yes, there is dollar protection in *every* design detail of these all-new Westinghouse transformers.

• • •

Get the facts from The Man With The Facts . . . your Westinghouse Sales Engineer. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70741

YOU CAN BE **SURE**... IF IT'S

Westinghouse

Helping the industry meet its growing loads

Men . . . not bricks and steel . . . make this laboratory great

Westinghouse has cut another ribbon! This time, we opened the doors at the Steam Division's new development laboratory near Philadelphia. Millions of dollars have been invested so that advanced development can bring you even greater value for your turbine dollar.

But it takes more than bricks and steel to build a great laboratory. It takes capable men. While the physical facilities here are equal to any in the world, the scientists and engineers now at work hold the real promise of great things to come from this project.

On the laboratory staff are men who are real leaders in prime mover development. Among them are those who brought you such famous Westinghouse developments as solid-forged rotors, stainless steel blading and the widely acclaimed Westinghouse governing system.

You will benefit from the laboratory through Westinghouse contributions to such organizations as AIEE, ASME and EEI. The laboratory will also bring you direct benefits—new and more advanced Westinghouse power plant equipment supplying more power at less cost and with greater dependability. J-97186-A

YOU CAN BE SURE...IF IT'S
Westinghouse

The new laboratory

Advanced development on turbine and heat transfer equipment will be conducted at the $6,000,000 Westinghouse engineering development laboratory in Philadelphia. This modern 4-story structure contains 40,000 square feet of laboratory space and is staffed by over 100 engineers and technicians. Facilities are the most modern that could be provided and include scientific apparatus from electronic computers to devices for handling radioactive isotopes.

Super-critical pressure

As the result of development work by the men who are staffing the new laboratory, the world's most efficient turbine with its surface condenser and feedwater heaters is now on order for Philadelphia Electric Company. The turbine is a 275,000-kw, super-critical pressure unit designed for 5000 psi, 1200°F—highest pressure and temperature ever projected.

Gas turbines

Relative newcomers in the prime mover field, gas turbines show promise of becoming one of the industry's important future sources of power. New applications and improved efficiencies are some of the many development projects being advanced by the engineers at this new Westinghouse facility.

Westinghouse Research Center—

providing the wealth of fundamental knowledge that is carefully directed into industry advancements by the many Westinghouse development laboratories. Vital to Westinghouse emphasis on industry progress, this new Research Center will be the finest facility of its kind.

New Mexico PS Names Head

D. W. Reeves has been elected president of Public Service Co of New Mexico. Formerly executive vice president of the company, Reeves succeeds Arthur Prager who has resigned his executive post and was named chairman of the board of directors.

Reeves also is president of Pubco Development, Inc, a subsidiary formed by Public Service for the exploration and production of oil and gas.

An electrical engineering graduate, the new president served with Gulf States Utilities Co and its predecessor from 1925 to 1938 as an assistant electrical engineer, power engineer, and superintendent of sales. Then he accepted the position of industrial sales manager with Oklahoma Natural Gas Co. He became general sales manager of the gas company after returning from World War II service with the Corps of Engineers in which he was responsible for utility contracts. In 1950 Reeves joined Public Service as executive vice president.

D. W. REEVES

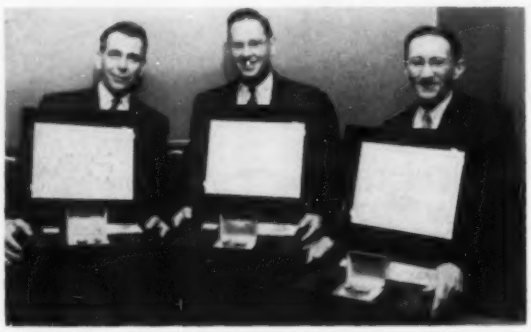
Three Receive Dow Awards

Outstanding achievement in company and community affairs has won for three Detroit Edison Co men their company's Alex Dow award for 1954.

Henry P. Johnson, 47, bridge foreman; George W. Matthews, 35, assistant district customer business superintendent; and Rudolph Miesel, 60, senior planning engineer, each received a citation, gold lapel pin, engraved watch, and five shares of the utility's stock.

Johnson received the award for "self-possession, outstanding judgment and quick action that played a major part in saving the life of a fellow employee." When a laborer was caught by the moving cab of an overhead crane and pinned inside a six-inch space between the cab and a tile wall, Johnson took instant command. Within ten minutes he had a hole smashed through the wall and the injured man lowered in a basket stretcher to a waiting ambulance.

"For outstanding leadership and extensive participation in civic and community affairs," the Dow award was given to Matthews. He is vice president of the Detroit Junior Board of Commerce and in charge of 18 committees. In 1954 he was named "Young Man of the Year" by the Jaycees.



WINNERS (l to r): H. P. JOHNSON; G. W. MATTHEWS; R. MIESEL

Miesel received the award for "conceiving and promoting a flexible and more economical method of crossing expressway grade separations with underground electric facilities." Under Miesel's plan, electric cables are run through pipes which are hung under expressway bridges. Previously, ducts were imbedded in the concrete of the roadway during construction—a costlier method which often required that the work be done years before the anticipated need.

PCEA Elects Scott President

Sam W. Scott has been elected president of Pacific Coast Electrical Association at its 38th annual convention held recently in San Francisco.

Scott, the Pacific district manager of Graybar Electric Co, has served as vice president and a director of PCEA. He is a former Pacific zone chairman and member of the board of governors of the National Association of Electrical Distributors.

The new PCEA president started work in 1914 with Westinghouse Electric Manufacturing Co as an office boy and later became a salesman. In 1928 he joined Graybar as a salesman. He became district sales manager in 1944 and was promoted to his present position in 1951.

S. W. SCOTT

What is extra-high voltage transmission?

What is extra-high voltage transmission? It's a little bit like asking how fast man can fly — the limit is constantly being raised!

Whatever its level may be, extra-high voltage transmission has always been a region of continuing research and investigation for Ohio Brass Company. Close league with the men and organizations who continually force transmission levels higher has enriched the entire O-B staff with an understanding of present-day insulation requirements that is unmatched in the insulator field.

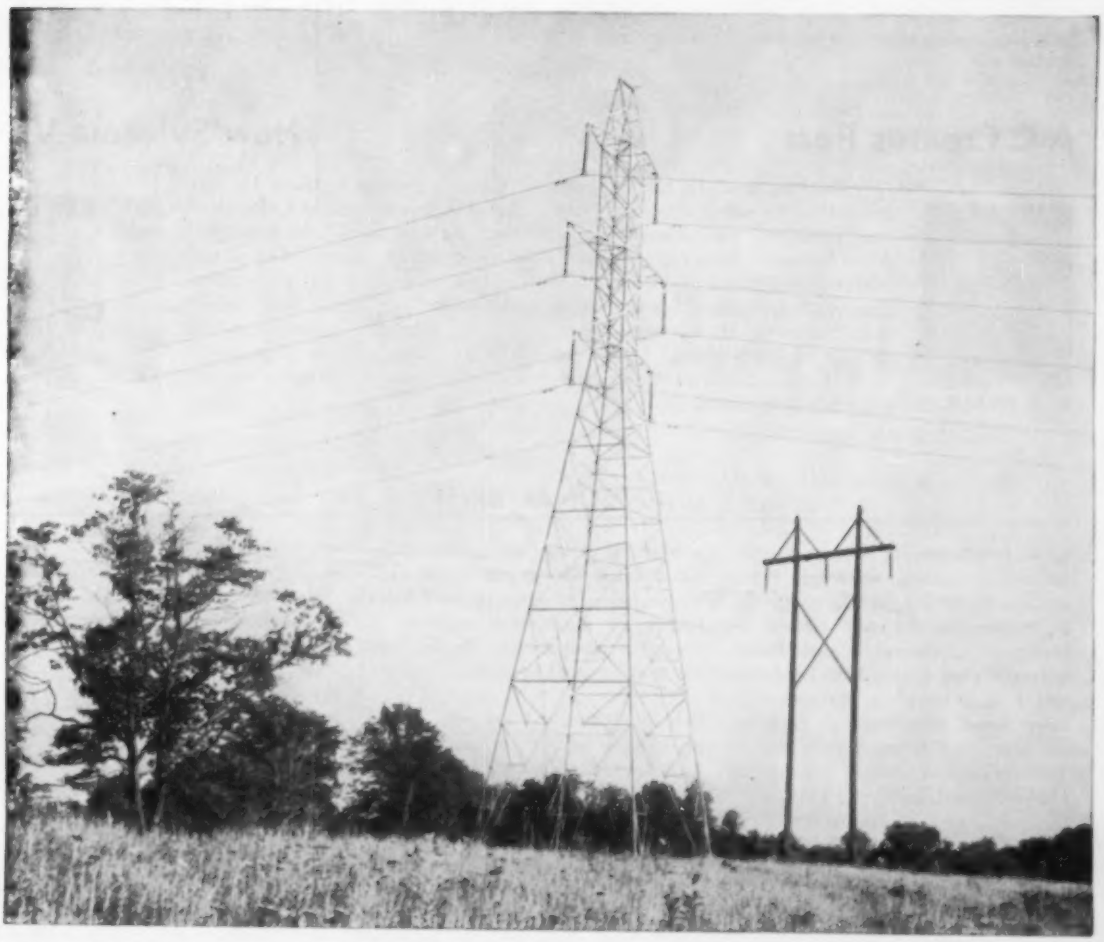
Because of that understanding, Ohio Brass is able to design and produce insulation of the highest character. And it is significant that Ohio Brass insulation has been selected for use in every extra-high voltage project now operating or under construction in the Americas.

Ohio Brass Company • Mansfield, Ohio

Steel tower of the OVEC 330-kv line provides an example of present "extra-high voltage" construction. Wood H-frame for 138-kv makes sharp contrast in size of tangent structures.

Ohio Brass

4543-H



Three Companies Make Executive Changes

J. J. WILSON

John J. Wilson has been named president of Datamatic Corp, a new organization formed by Minneapolis-Honeywell Regulator Co and Raytheon Manufacturing Co to engineer and market large high-speed electronic data-processing systems.

Wilson, former vice president of M-H, will have his headquarters in Waltham, Mass. Walter W. Finke, former assistant to the president of M-H, has been named vice president.

C. N. JOHNS

Cyrus N. Johns, president, American Chain & Cable Co, Inc, has been elected the company's chief executive officer to succeed Wilmot F. Wheeler, who has held this position since 1946. Wheeler will continue as chairman of the board.

Wilmot F. Wheeler, Jr, assistant to the president, has been elected a vice president. Arthur C. Laske has been made treasurer in addition to his duties as secretary.

McCLURE KELLEY

Baldwin-Lima-Hamilton Corp has elected McClure Kelley president to succeed Marvin W. Smith who becomes chairman of the executive committee. Robert G. Tabors and Arthur Clements were elected vice presidents of the Hamilton (Ohio) Division.

Kelley, a law graduate of George Washington University, served as president of Western-Austin Co from 1942 to 1954 when he joined B-L-H as executive vice president.

A-C Creates Post

W. A. YOST, JR

William A. Yost, Jr, has been appointed to the newly created post of vice president, staff operations, of Allis-Chalmers Manufacturing Co. Formerly vice president, General Machinery Division, Yost has been with A-C since 1943. He was named manager of the steam turbine department in 1947 and manager of the mechanical power department in 1951.

New Sylvania VP

Sylvania Electric Products, Inc, has elected Arthur L. Milk as a vice president. He had been director of government relations since 1947 and will continue as head of that department, responsible for liaison with federal civil and military agencies. Milk has been with the Sylvania organization and a predecessor company for the past 30 years.

A. L. MILK

PERSONAL BRIEFS

E. W. Middleton has become superintendent of system operation, Pennsylvania Power & Light Co, to succeed **J. Walter Minnich** who retired recently . . . Central Illinois Public Service Co has elected **J. R. Broderick** and **J. I. Dilsaver** as directors . . . **Leon Szorc,** formerly with Moloney Transformer Co, has joined Marcus Transformer Co as chief engineer of Liquid-Filled Transformer Division.

New Orleans Public Service, Inc, has announced the following appointments: **B. H. Bell** as superintendent of electrical operation; **R. Mallard Seago** as superintendent of mechanical operations; **Sidney Ellis** as mechanical engineer in charge of operation; and **Allen Jensen** as mechanical engineer in charge of maintenance—the last two are newly created positions.

Bert W. Whitehurst has been named president of Hawkridge Metals Corp, Boston, Mass. He will continue to maintain his general consulting engineering office in Boston.

Allan F. Elder, assistant treasurer of Washington Water Power Co, has been appointed treasurer to succeed the late **Carl E. Gieseker . . . Rex Hardy** of Los Angeles County, an attorney, has been appointed to California Public Utilities Commission by Gov G. J. Knight.

Frederick C. Gardner, president and chief executive officer of Ebasco Services, Inc, has been elected a director of Electric Bond & Share Co . . . Schield Bantam Co has appointed **Buel M. Wallis** as general sales manager. Previously Wallis served as general sales manager of the Adams Division, LeTourneau-Westinghouse Co. (*More Personal Briefs on page* 42)

VARNISHED CAMBRIC CABLE

In single conductor sizes from #14 A.W.G. to 2,000,000 C.M. In multiple conductor sizes from #14 A.W.G. to 750,000 C.M. For use up to 17,000 volts between conductors for non-shielded multiple conductor cables; for single conductor and shielded cables operating on an ungrounded neutral system not over 21,000 volts between phases, and for single conductor and shielded cables operating on a grounded neutral system not over 28,000 volts between phases.

Insulated with varnished cambric tape, in accordance with I.P.C.E.A. and Underwriters' specifications unless otherwise specified by you.

Manufactured with solid conductors or stranded in a variety of strandings, coated or uncoated, according to your needs. Available in single or multiple conductor.

For outside covering, you have a choice of braid, for service in dry locations; lead, for service in damp locations; and for aerial use or direct burial we recommend a protective armor such as steel tape or galvanized round wire armor.

AS LEADS FOR MOTOR AND OIL SWITCHES, GENERATORS, TRANSFORMERS,

YOU WANT

- TOP RESISTANCE TO HIGH OPERATING TEMPERATURES, OIL AND GREASE;
- DEPENDABILITY THAT SAVES REAL TIME AND MONEY—

IN SHORT,

YOU WANT

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

How Union Electric met the cry for MORE KVA . . . ECONOMICALLY

Faced with today's universal problem of growing secondary loads, Union Electric Co. of Missouri found a swift economical answer in the new General Electric standard 167-kva transformers.

In one area near Festus, Missouri, Union Electric needed to increase kva capacity and at the same time change distribution voltage from 2400/4160 wye to 7200/12470 wye. It was desirable, however, to use existing poles and to maintain existing clearances. Lightweight, low-height units were obviously required.

The company did the job quickly and economically by installing the new G-E standard 167-kva transformers. The average time for mounting from ground to crossarm was less than five minutes. No special riggings were necessary and no platforms had to be built.

The new 167-kva transformer is another result of G-E research in a continuous program to reduce transformer weight and height. Today the 167-kva unit is ***670 pounds lighter and 14" lower than before.*** It is now in the pole-type class and is available as a standard unit.

Thanks to G-E engineering developments you can now hang distribution transformers of higher kva ratings without replacing poles and without building costly platforms. Let G.E. help solve your load growth problems. Simply call your nearest G-E Apparatus Sales Office. General Electric Co., Schenectady 5, New York. 431-34

Progress Is Our Most Important Product

GENERAL ELECTRIC

OLD 167-KVA UNIT VS. NEW STANDARD 167-KVA UNIT

OLD		NEW
2170 lbs.	Weight	1500 lbs.
67 1/4"	Height	54"
740 Watts	Core Loss	550 Watts
1.25% at 1.0 p-f	Regulation	1.25% at 1.0 p-f
3.5% at 0.8 p-f		2.9% at 0.8 p-f

NEW

G-E standard 167-kva unit goes from ground to crossarm in 5 minutes

Personal Briefs

(*Continued from page* 38)

Clifton M. Howard has been made operating superintendent of Northern Division of Pennsylvania Electric Co . . . Dayton Power & Light Co has promoted **Clifton R. Mede,** manager of Greenville district, to Western Division manager . . . **Adolph A. Meyer,** Tennessee Valley Authority design engineer, has resigned to become design head of Cauca River Development Corp, Colombia, South America.

O. B. Boydstun, chief counsel for Grand River Dam authority, has become acting general manager to replace **Glenn R. Key** who resigned to enter private business.

Reynolds Metals Co has announced these appointments in its Reduction Division: **James C. Black** from general manager-eastern to general manager of division; **E. J. Appel** from general manager-western to manager of facilities development; **H. W. Shoemaker** from manager of aluminum reduction plant at Longview, Wash., to manager of Troutdale, Ore., reduction plant; **V. G. Kneeskern** from assistant plant manager to manager at Longview.

OBITUARY

Clarence F. Whiteman, 65, retired superintendent of the service department of Cleveland Electric Illuminating Co, died May 6.

Edward F. Hauser died in Los Angeles, Calif., on May 17. He was a former manager of the Indiana Statewide Rural Cooperative and secretary of the Indiana Electric Association.

Francis W. McDermott, 34, a manager of Florida Power & Light Co for eight years, died on May 15 at Lake Wales, Fla.

Arthur J. Turner, 76, retired chief engineer for Washington Water Power Co, died recently in Spokane, Wash.

Louis A. Connelly, 59, died from a heart attack on May 20 at Medford Lakes, N. J. For the past 13 years he had been manager of the government department, Engineering Products Division, of Radio Corp of America.

MEETINGS CALENDAR

An extended list of coming meetings appears in the last issue of each month

JUNE

ELECTRIC LEAGUE OF LOS ANGELES—3rd Annual San Fernando Valley Air Conditioning Exhibit, Los Angeles City Department of Water & Power, June 1-July 31.

ADVERTISING FEDERATION OF AMERICA—Golden Jubilee Convention, Palmer House, Chicago, June 5-8.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Oil and Gas Power Conference, Statler Hotel, Washington, D. C., June 5-10; ASME-IME Comb. Conference, MIT, Boston, June 15-17; Applied Mechanics Conference, Rensselaer Hotel, Troy, New York, June 16-18; Diamond Jubilee Semi-Annual Meeting, Statler Hotel, Boston, Mass., June 19-24.

STEELE-WASECA COOPERATIVE ELECTRIC—Annual Meeting of Members, Owatonna, Minn., June 7.

THE NATIONAL FOREMAN'S INSTITUTE—Work Simplification and Methods Improvement Conference, Park Sheraton Hotel, New York, June 7-9.

AMERICAN WELDING SOCIETY—Spring Meeting and Welding Show, Hotel Muehlebach, Kansas City, Mo., June 7-10.

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION — General Assembly Meeting, Stockholm, Sweden, June 8-18.

ILLUMINATING ENGINEERING SOCIETY—Northeastern Regional Conference, Ft. William Henry, Lake George, New York, June 10-11.

ELECTRIC COMPANIES ADVERTISING PROGRAM—Management Group, Statler Hotel, Los Angeles, Calif., June 12.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Steering Committee, Statler Hotel, Los Angeles, June 12.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS—42nd Semi-Annual Meeting, Hotel Schroeder, Milwaukee, Wis., June 12-15.

EDISON ELECTRIC INSTITUTE—23rd Annual Convention, Los Angeles, Calif., June 13-16.

COMMISSION INTERNATIONALE DE L'ECLAIRAGE (International Commission on Illumination)—Zurich, Switzerland, June 13-23.

STATE UNIVERSITY OF IOWA MANAGEMENT COURSE—State University of Iowa, Iowa City, June 13-25.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Magnetics Conference, Hotel William Penn, Pittsburgh, June 14-16; Summer General Meeting, New Ocean House, Swampscott, Mass., June 27-July 1.

AMERICAN SOCIETY FOR ENGINEERING EDUCATION—63rd Annual Meeting, Pennsylvania State University, State College, Pa., June 20-24.

NORTHWEST ELECTRIC LIGHT & POWER ASSOCIATION—Accounting and Business Practice Section, Vancouver Hotel, Vancouver, B. C., June 22-24.

WISCONSIN UTILITIES ASSOCIATION—Accounting Section, Dell View Hotel, Lake Delton, Wis., June 26-28.

MICHIGAN ELECTRIC ASSOCIATION—Annual Convention, Grand Hotel, Mackinac Island, Mich., June 26-29.

AMERICAN SOCIETY OF TESTING MATERIALS—1955 Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-July 1.

AMERICAN NUCLEAR SOCIETY—1st Annual Meeting—Pennsylvania State University, State College, Pa., June 27-29.

CANADIAN ELECTRICAL ASSOCIATION—Annual Convention, Hotel Vancouver, Vancouver, B. C., June 27-29.

INTERNATIONAL ELECTROTECHNICAL COMMISSION—London, England, June 28-July 9.

JULY

NATIONAL ASSOCIATION OF RAILROAD UTILITIES COMMISSIONERS—Executive Committee Meeting, LaSalle Hotel, Chicago, Ill., July 8.

NATIONAL HOUSEWARES AND HOME APPLIANCE MANUFACTURERS EXHIBITS—Atlantic City, N. J., July 11-15.

AUGUST

NATIONAL SHADE TREE CONFERENCE—31st Annual Convention, Mar Monte Hotel, Santa Barbara, California, Aug. 1-5.

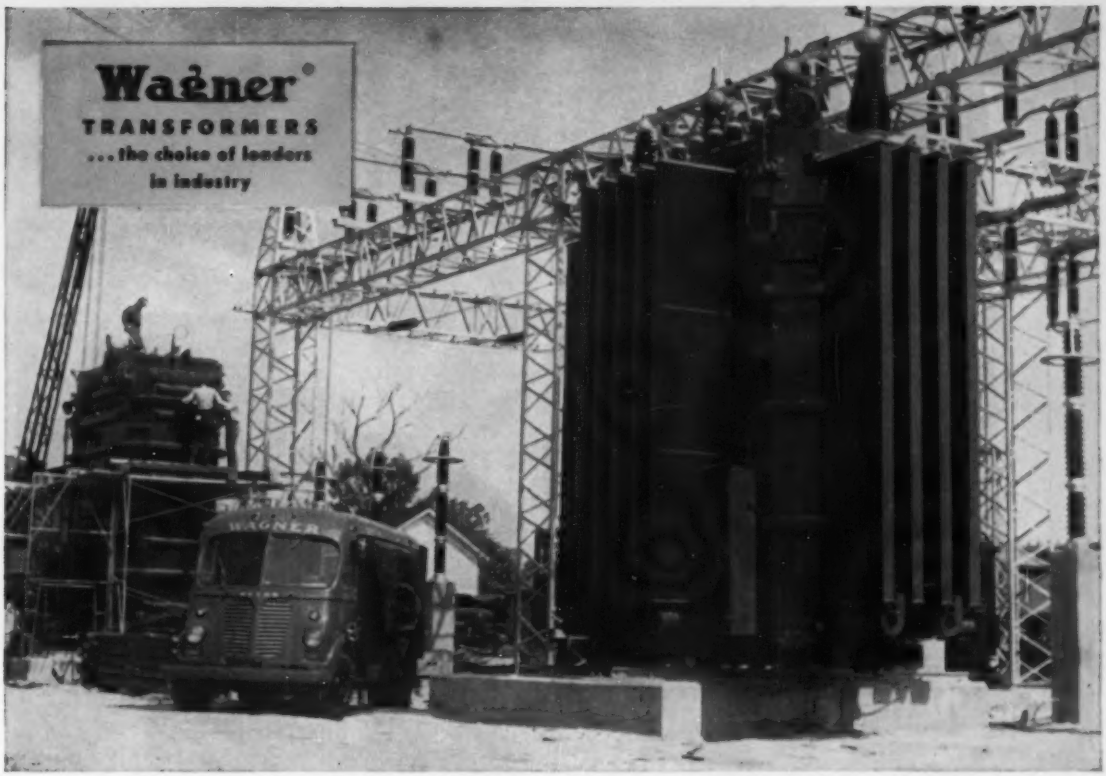
SOUTHEASTERN ELECTRIC EXCHANGE—Personnel Administration Section, Roanoke Hotel, Roanoke, Va., Aug. 11-12.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—Pacific General Meeting, Butte, Mont., Aug. 15-19.

SEPTEMBER

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Annual Fall Convention, Grand Teton Lodge, Jackson Hole, Wyo., Sept. 11-14.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—2nd Electrical Conference of the Petroleum Industry, Shamrock Hotel, Houston, Tex., Sept. 12-14.



...to help meet today's power needs in Memphis, Tennessee

In Memphis, Tennessee—the Memphis Light, Gas & Water Division recently completed the installation of two new Wagner 25,000/33,333 kva, 3 phase, 60 cycle power transformers at its new Adams Street sub-station.

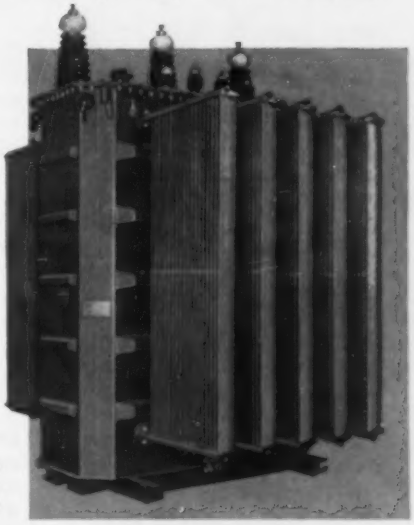
Two additional Wagner transformers of the same rating are located at Woodstock, Tennessee—making a total of four such units installed by this company to enable it to better serve Memphis and the surrounding area.

These four new transformers mean plenty of additional power for a growing Memphis and its citizens who are using more and more electricity every year.

To facilitate the installation of these Wagner Transformers, one of Wagner's specially equipped transformer service trucks was used at the work site. Wagner field service engineers helped supervise the installation.

That Wagner Transformers were chosen points up the fact that more and more electrical utilities are looking to Wagner for their transformer needs.

Why not consider Wagner Transformers for your next installation? 32 branch offices are maintained for quick, convenient engineering service and consultation. Write for Bulletin TU-180 and TU-181. They give full information on Wagner Power and Distribution Transformers.



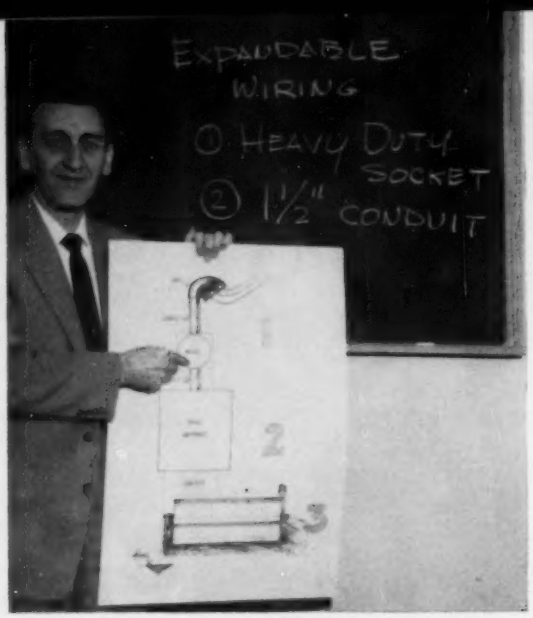
Check ASA C57.12a Standards for your next power transformers. You'll save time and money.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave. • St. Louis 14, Mo., U. S. A.
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC
BRANCHES IN 32 PRINCIPAL CITIES

T55-14

R. A. JOHNSON, WWP advertising supervisor, prepares material for company's drive to "sell" 200-amp facilities



AIDED BY CHARTS, WWP's Harold Wright has been explaining new installations to builders, contractors, and others

Spokane Adopts 200-Amp Entrance

City follows Washington Water Power recommendation to amend electrical code. Inadequate service entrance caused $84,000 appliance sale loss in six months

Spokane has become the first city in the United States or Canada to require installation of 200-amp meter socket and 1½-in. minimum rigid conduit to accomodate service entrance wires in new homes. The Spokane city council has amended the electrical code to require the expandable wiring facilities in virtually all homes constructed inside the city limits after March 29, 1955.

The change in the electrical code was proposed by the Washington Water Power Co, based on a forecast by Pres Kinsey M. Robinson. He pointed out that the use of electricity is increasing rapidly in Spokane homes and that the average domestic customer consumes 6,910 kwhr annually, about 2½ times the national average.

Robinson cited the loss of appliance sales because of inadequate service entrances. He estimated that dealers lost more than $84,000 in six months in unsold or returned appliances.

Code Requirements . . . Gordon Defoe, WWP general sales supervisor, assisted city attorneys in framing the code amendment. It provides that residential service entrance requirements must comply with one of two alternatives:

- In new single-family dwellings more than 500 ft sq the service entrance conductor shall be 1½-in. minimum rigid conduit or electric metallic tubing, using an approved 200-amp meter socket, or
- In new dwellings less than 500 sq ft builder may comply with above provisions or use exposed wiring on exterior of building passing only through the building wall. Parallel runs of cable are not allowed. This second alternative is not permissible in city fire zones 1 and 2, which rules it out in approximately 90% of city's commercial and residential area.

Little Opposition to Change . . . Defoe emphasizes that the ordinance does not require installation of 200-amp service entrances in new homes. It merely requires that the pipe and socket installation be capable of handling 200 amp when it becomes necessary.

The only resistance to the 200-amp proposal came from a handful of electrical contractors who had been selling rewiring jobs.

The bulk of the city's contractors supported the proposal, partly because, as one put it, "the 200-amp law cuts out rewiring gravy. It puts us all on an equal basis competitively."

Frank Tool, manager of Inland Empire Electric League, an organization of dealers, points out that with the high consumption of electricity in the area, "the 100-amp service entrance is already obsolete."

Praises WWP . . . Tool added, "WWP is one of the few operating companies in the U. S. that has changed to a 13-kv distribution system and the company indicates the time is not too far away when it will go to a 22-kv system." At present about 60% to 70% of the total system is 13 kv.

WWP has begun an extensive promotional campaign to sell the 200-amp capacity service entrance idea to builders outside Spokane. These are not required by law to install the units. Newspaper ads and talks by WWP personnel are helping to sell the bigger entrance on an area-wide basis.

When the amended city electrical code was proposed by WWP, it was endorsed by all groups concerned with home design and building.

A pencil pokes through this corroded metal! Why chance trouble like this? Cathodic Protection and Anaconda Type CP Cable effectively check corrosion of buried metals.

CHECK CORROSION by cathodic protection with Anaconda Type CP Cable

Corrosion of buried metals costs industry over a *billion dollars a year!*

But most of this can now be prevented–by Cathodic Protection.

Corrosion–caused by minute electric currents flowing from metal into adjacent soil–is checked by applying direct current from an external source. This eliminates anodic areas, makes the entire metal surface cathodic and stops the flow of current from the metal.

But moisture, oil, acids and alkalies often found in corrosive soil areas are tough on cable.

Because of our many years of experience with buried cable, Anaconda has been able to produce a new Type CP cable – specially designed with double jacket of polyethylene and Densheath* (PVC) – to resist these enemies of cable life. This means less replacement . . . major savings in both labor and material costs.

Would you like more information on how Cathodic Protection checks corrosion?...and detailed information on Anaconda Type CP Cable? Ask the Man from Anaconda – or send for bulletin DM 5450, "Anaconda Cathodic Protection Cable." Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

53340

* Reg. U. S. Pat. Off.

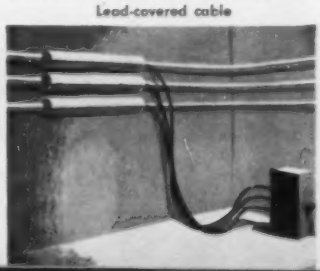
ANACONDA®

COPPER AND ALUMINUM WIRE AND CABLE

Where Anaconda Type CP Cable and Cathodic Protection Cut Corrosion Costs.

Gas mains and water pipes

Lead-covered cable



Underground storage tanks

Transmission towers

No Finer Apparatus Insulator!

It's VICTOR . . .

made of Purified Porcelain . . .

VICTOR
No. 729
STACKING UNIT
(TS NO. 160)

With VICTOR "Know-How"

Correct design, quality-controlled manufacture, accurate jig assembly and *Purified* Porcelain make VICTOR Apparatus Insulators supreme in their field. These insulators give power men complete assurance because they combine maximum dielectric and mechanical strength. Each VICTOR Apparatus Insulator is individually tested at every point of manufacture. Each has to be precision-perfect before it is shipped. That's why these units are easier to install singly or in stacks, why they stand up better in service . . . why more and more power men are specifying VICTOR.

FEATURES

1. **MAXIMUM MECHANICAL STRENGTH** guarantees on-the-job dependability.
2. **PRECISION ASSEMBLY** assures perfect alignment . . . greatest possible stacking ease.
3. **MADE OF PURIFIED PORCELAIN** each insulator has unequaled uniformity of mechanical and electrical values, and resistance to thermal variations.
4. **THICK, RUGGED CORRUGATIONS** afford maximum resistance to impact . . . cut breakage costs.
5. **SCIENTIFICALLY COMPOUNDED CEMENT** assures high bond strength at all assembly joints.
6. **CAPS AND BASES** are hot-dipped galvanized for maximum resistance to weathering and corrosion . . . are engineered to exceed NEMA specifications.
7. **SMOOTH, HARD GLAZE** assists self-cleaning process, reduces maintenance and replacement costs.
8. **RESILIENT COATINGS** at all cemented joints give maximum resistance to thermal variations and mechanical shocks or impact.

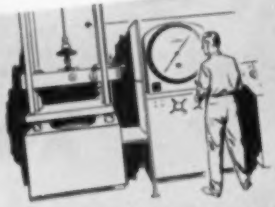
SPECIFICATIONS (SINGLE UNIT)

60 cycle dry flashover	160 KV
60 cycle wet flashover	95 KV
Pos. impulse flashover*	235 KV
Neg. impulse flashover*	290 KV
Withstand voltage 60 cycle dry	115 KV
Withstand voltage 60 cycle wet	75 KV
Withstand impulse voltage*	210 KV
Puncture	215 KV
Dry arcing distance	14¾"
Leakage distance	33"
Tension strength	20,000 lbs.
Torsion strength	40,000 lbs.
Compression strength	60,000 lbs.
Cantilever strength base mtd.	7000 lbs.
Cantilever strength cap mtd.	4000 lbs.
RNI	100 microvolts
1000 KC at applied	22 KV

*Crest KV. 1½ x 40 microsecond wave critical value.

For the full facts on Victor "Know-How," write for "The Story of Victor and Purified Porcelain." For engineering data on Victor insulators, write for Bulletin No. 4.

NEWS FROM VICTOR



To take care of expanded test facilities, the Victor high voltage laboratory has been greatly enlarged and a new 120,000 pound Tinius-Olsen hydraulic testing machine (shown in drawing above) installed. This machine exerts a programmed load on a test piece while subjected to high voltage current. Tests are run to destruction either by mechanical or electrical failure.

SPECIFY VICTOR

Purified Porcelain Pintypes

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware

MEETING REPORT

Bowden Tells PEA System Planning Committee . . .

Explore New Ways to Serve Growth

American industry must expect growth; the in-born inertia of this country is beyond comprehension. Engineers striving to satisfy this growth must not be scared out of new fields because neither financiers, "brains", nor "brass" know any more about it than engineers. But engineers must not confuse forecasts with planning.

This was the essence of the remarks of Pennsylvania Power's Executive Vice-President C. S. Bowden to the Pennsylvania Electric Association System Planning Committee at New Castle, May 16. Other speakers participated in an all-day symposium on "Practical Solutions to System Planning Problems."

Generation planning for Pennsylvania Power & Light Co, said W. U. Baum, follows these principles:

1. Use large units in large stations.
2. Coordinate transmission with load areas to cut cost.
3. Design for long term use.
4. Provide operating flexibility.
5. Disperse plant for protection against catastrophe.
6. Locate for minimum fuel and transmission costs.

Remote Generation Needs Capacitors

Building generating plants remote from load centers focuses attention on reactive supply, said M. C. Westrate, Commonwealth Associates. Limiting distance for its supply by generators on a 138-kv system is 50 miles. Westrate advocated adding ckvar to each load area to limit voltage drop in emergency to 5%.

Installing a 25-Mvar 66-kv switched capacitor at one transmission substation and equal capacity in smaller units at other sites avoided overloading a 100-Mw interconnection with Consolidated Edison Co prior to starting up a new 100-Mw generator, reported J. L. Davidson, Long Island Lighting. Subsequently this unit was relocated farther from generation to correct reactive reserve.

Permitting system loads to increase until cost of losses equals fixed charges would give the theoretical minimum cost of delivered power, said F. M. Reed, General Public Utilities. Switched capacitors assist in securing an economic balance.

Stability studies serve many purposes at Philadelphia Electric Co, said Emil Kasum. They show the system inherently stable except for Conowingo hanging on the ends of two long 230-kv lines.

Completion of the 250-Mw Shawville station in western Pennsylvania to feed power eastward over a 230-kv interconnection to Metropolitan Edison Co created a stability problem, reported R. W. Werts, General Public Utilities. Limiting factor is ability of 115-kv system to absorb output if the 230-kv line opens. Solution is to trip one or both Shawville generators for a line fault.

Unusual planning problem for Delaware Power & Light Co is to provide capacity for a semi-isolated portion of their system. Henry Evans compared two proposals:

1. Four new 45-Mw generators at two new sites.
2. Reconductor 69-kv transmission and convert part to 138 kv to delay generation program which later places two 75-Mw units at one new site.

The latter plan saves $12.7 million of investment and cuts operating costs.

Bundling will be used increasingly for transmission, predicted I. L. Phillips, Pennsylvanis Electric Co. Applied to one 115-kv line which became a system bottleneck, it cost $45,000 less than re-conductoring.

Duquesne Light Co's 69-kv transmission ring built in 1922 for 190 Mw has carried 940 Mw with little change except closer spacing of generating stations, reported W. G. Dempler. Now capacity is being added at 138 kv because:

1. It cuts cost per kw in half.
2. It saves right-of-way expenses.
3. It eliminates use of larger than 1,000 MCM for station buses even for 250-Mw generators.

Connection of two 37.5-Mva transformers on the Springdale 132-kv bus is considered by West Penn Power Co the best supply for ten 25-kv subtransmission circuits serving 67 Mva of nearby load, said S. J. Grden. Cost of this plan is higher than replacing present transformers on the 11-kv bus, but advantages are:

1. Permitting flexible operation of generators and boilers.
2. Providing more capability.
3. Retaining investment and capacity of present 25-Mva banks on the 11-kv bus.

Reuse or salvage value of replaced equipment and the need for extra capacity hold the key to boosting subtransmission voltage, said H. R. McNutt, Jr. For West Penn Power little opportunity exists to use displaced equipment, and savings would not pay the cost of changing 25 to 44 kv until after 1975.

Double-Circuit Reliability Good

Service to a customer from both circuits of a double-circuit line meets reliability needs, reported D. R. Davidson, Cleveland Electric Illuminating Co. Failures sometimes affect both circuits but rarely hold both out of service. Record shows 5.8 min per year interruption time for double-circuit customers against 20.3 for single.

Two concepts guide 4.8-kv distribution planning for Hartford Electric Light Co, said L. M. Webb. These are:

1. Area in sq mi that can be served by one feeder at any load density.
2. Rate of load growth at various load densities. Records show growth slows down as density increases.

Distribution is at 4 kv for half of Potomac Electric Power Co's load, reported F. W. Willcutt. Primary network is expanding for the lighter-density area but may be relieved on the fringe by converting to 13 kv radial.

But Duquesne's Verona network is about to revert to radial operation, said C. M. Stearns. Reasons are:

1. Cost to add capacity as a network is $312,000 while rearranging to radial gives capacity for only $50,000.
2. Single breaker on radial circuit will clear faster than two breakers on network mains.

Harold Quinton, EEI president, left, and J. B. Black, chairman, Pacific G&E Co, look at program of convention where PCEA was told . . .

2 Challenges Face Electric Industry

- Greater sales are needed to meet competition for consumer's dollar
- Greater efforts must be made against the continued threat of public power

Challenges of greater sales to meet competition for the consumer's dollar and of greater effort against the continued threat of professional public power advocates face the electric industry. These tasks were keynoted by Harold Quinton, president of Edison Electric Institute and Southern California Edison Co, before the 38th annual convention of the Pacific Coast Electrical Association in San Francisco, May 11-13.

More and Better Salesmen Needed . . .

"Our work is cut out for us to measure up to the standards and expectations which we have set and created in the minds of the American people," Quinton said. The job requires a selling effort to maintain a good rate of business growth that is sound and healthy. Unless sales departments are adequately and capably manned, the industry may find itself unprepared to meet the competition for the consumer's dollar.

In emphasizing that cooperation is needed in adequate wiring, he pointed out that EEI is re-examining wiring methods to assure safe and adequate wiring for the big loads now being built. With the modern home of tomorrow capable of 100 kw of connected load, it seems clear that the fundamental engineering of wiring systems must be re-examined.

Quinton stated that free enterprise cannot be driven out or starved out of the power business without profoundly and adversely affecting the future of other basic industries. He called for regulation of the industry to be left in the hands of the states, with a withdrawal of the federal government to eliminate a costly, onerous, and confusing overlapping of jurisdiction. Power companies can continue to make a great contribution to the maintenance of genuine free enterprise in this country and thereby help conserve genuine political freedom.

Public Must Understand Utilities . . .

"Hundreds of people in all walks of life tell me the private power companies live right but are not understood too well," R. C. Setterstrom, president, Northwest Electric Light & Power Association, said in reference to the public relations problem of the industry. For the Pacific Northwest in particular, he felt the Eisenhower Administration has proposed a sensible, workable partnership program of power development. But orderly development is being hampered by those who would gain politically by labelling the program a "give-away" of national resources. Just as building a better product will not alone put it on the utilities lines, acceptance of the aims of the industry require a constant and determined selling effort.

Backing up keynoter Quinton's remarks, PCEA Pres Roy N. Dreiman, Pacific Gas & Electric Co, noted that 95% of all home-owners are up against the bottleneck of inadequate wiring. This includes homes only recently built. Public acceptance of new and larger-load appliances has given the industry the responsibility of helping to break this bottleneck.

Fair Tax For Co-ops Advocated . . .

Denunciation of favorable tax positions enjoyed by cooperatives and other tax-exempt business and a demand for repeal of laws covering these exemptions was sounded by Joseph F. Leopold, public relations counsel, Dallas, Tex. Involved in this repeal are a billion dollars or more, "enough to make a legitimate reduction in taxes you and your business pay today," he said. Support by utility executives of two bills now awaiting Congressional action was urged. The first, by Rep. Noah M. Mason (Ill.), would tax total earnings of cooperatives before distribution of patronage dividends. Another measure, by Rep. Clifford Davis (Tenn.), proposes to tax all cooperatives in full and to provide tax credits for those getting dividends from them.

The need for ever-increasing efficiency of operation to meet tax-free government competition and the focusing of management attention on the cost and amount of office paperwork are two primary reasons for the growing importance of electronic business machines to the utility industry, said J. K. Horton, vice president, PG&E.

Opportunities of machine methods are found in a recent Hoover task force report, he said, that compares costs of processing data—hand calculation, $25; tabulating equipment, $5; and automatic machine, $1. Horton pointed out that $500 in cost savings equals $7,500 in sales in the final effect on earned surplus.

Electronic Machines Aid Utilities . . . Electronic calculators are proving more efficient than methods they replaced for at least 100 utility companies, reported George Trexler, utility department manager, IBM Corp. One utility that ordered data processing machines expects to save about $750,000 annually from their operation.

Mark-sense meter reading and punched bills are essential to full utilization of electronic business machines, although they can be incorporated efficiently into present punched card procedures. In materials and supplies, machines offer the potential of holding the investment to a workable minimum in proportion to the cost of essential records.

Every Worker Makes the Sale . . . The biggest task in industrial relations is to help every worker at every level see that his job is really a part of making a sale to the ultimate consumer. Along with the responsibility, said Col Alexander R. Heron, vice president, Crown Zellerbach Corp, management has the moral and practical obligation to provide jobs by meeting the essential demands that the nation places upon the economy.

The company as a good citizen, "virtually concerned with everything that advances our nation and the community we serve," is one of the key factors in a strong public relations program, said Henry B. Sargent, president, Arizona Public Service Co. A public relations program also should cover efficient operations that mean economies for the customer and attractiveness to the investor; generation of faith in the company for the assurance of the employee, customer, and shareholder; and a recognition of the responsibility to further the interests of the company and the industry.

Elected as president of PCEA to take office June 1 was S. J. Scott, Graybar Electric Co, Los Angeles. New directors elected to two-year terms include H. C. Gerster, General Electric Supply Co; and L. G. Maechtlen, Square D Co, both of Los Angeles.

Reactor Insurance Planned

Ebasco clients told physical damage and third party liability coverage have developed markets and may be available soon

Physical damage and third party liability insurance coverages for atomic reactor operators have developed markets in recent months, W. B. Sims told the 13th Annual Insurance Conference at New York. The conference, May 1-3, was conducted by Ebasco Services, Inc, for its public utility clients. Sims is assistant manager of Ebasco's insurance department.

Insurance men, he said, were hopeful that the details of such coverage would be worked out "sometime prior to the actual need for insurance protection." His talk reviewed both engineering and insurance problems of public utilities in the developing field of atomic energy utilization.

Patrol Aircraft May Get Special Rate . . . "Extensive use of industrial aid aircraft by public utilities for line patrol and other purposes has created a sufficient spread of risk and exposure basis to warrant serious consideration of the establishment of a special rate and coverage treatment of this type of business by insurance companies," C. W. Pearson, Ebasco consultant, told the utility men.

Stressing the importance of supervision of liability insurance carried by contractors doing utility construction work, Pearson said:

"In several instances utility companies have been subject to claims under their own public liability insurance due to insufficiencies in the insurance coverages of independent contractors. This leads to the conclusion that unless the utility is to be saddled with the cost of claims for which others are responsible, with corresponding increases in its insurance or self-insurance costs, it must make a careful study of the insurance coverages and limits it will require of its contractors."

Only by doing this, he added, can the utility make certain that "the contractor's insurance covers to the full extent of his legal and contractual obligations under the construction contract."

Frank Hornby, Jr, Ebasco consultant, noted that "available statistics indicate that crime losses are now running over $1 billion a year and are larger than fire losses. Of these losses," he said, "approximately 5% are covered by insurance."

"Public acceptance of the deductible principle in health insurance, eliminating small budgetable claims, will enable Blue Cross and insurance companies to offer extensive nursing, hospital, and medical coverage for the prolonged and chronic types of illnesses at a cost within reach of the average wage earner," said J. C. Rauch, Ebasco analyst.

G. G. Blair, Ebasco fire protection engineer, stated: "The success or failure of a self-insurance program will depend directly upon the care and thoroughness with which the reserves for the program are determined and established and then upon the maintenance of those reserves inviolate."

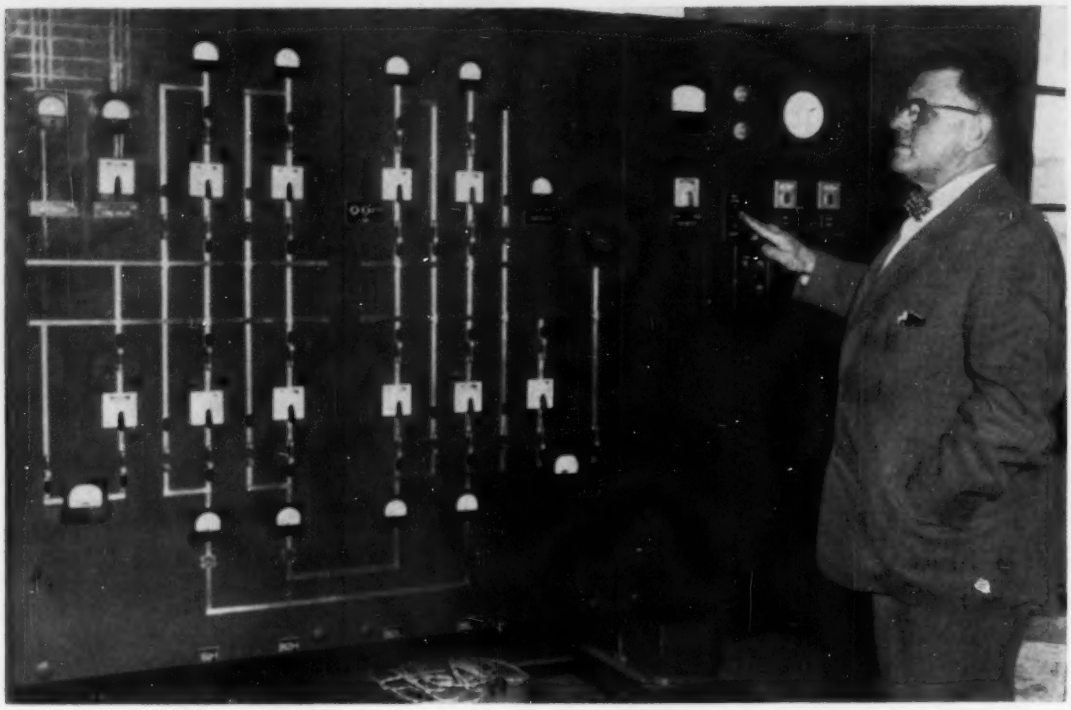
McKenzie Dam Hearings Set for June 7 by FPC

Federal Power Commission will hold public hearing in Washington, D. C., June 7 on Eugene Water & Electric Board's application for a 50-year license to build a $7-million, 30,000-kw hydroelectric project on Oregon's upper McKenzie River.

EW&EB conducted engineering studies on the site, 75 miles east of Eugene in the Willamette National Forest, under a preliminary permit.

Protests are expected to be heard from the Federation of Western Outdoor Clubs, the McKenzie River Chamber of Commerce, the Save-the-McKenzie Association, and commercial interests concerned with sports, fishing, and recreation. All seek to preserve the McKenzie's fame as a fishing stream and scenic spot.

The plan involves construction of a diversion dam at the outlet of Clear Lake, dropping the water through a tunnel to a power plant at Beaver Marsh. A storage dam between Clear and Fish lakes, to utilize the seasonal capacity of the latter, is a part of the program. EW&EB has claimed the Oregon Game Commission considers the storage additions valuable to fish-life by maintaining streamflow.



At Connecticut Light & Power Co . . .

Board Trains Substation Operators

As the result of a training aid constructed by employees of the Connecticut Light & Power Co and put into use in the substation operator's training program, trainees will have the opportunity to "learn by doing—before the situation arises."

The training aid is a 6x4 plywood panel painted black to resemble an actual substation board (see above). Simulated there are two incoming high voltage transmission lines, two transformer bank positions with high and low side breakers, two outgoing distribution circuits, and high and low side busses. As in an actual station, circuit breakers and disconnect switches are simulated by miniatures.

Instruments have been installed on the board to indicate which circuits are carrying loads and which busses and lines are alive. Meter dials also enable trainees to read the current on incoming transmission lines, transformer banks, and outgoing circuits. Red and green indicating lights on all the circuits also show whether the circuit is opened or closed.

In addition certain breakers have relays which function in demonstrations of overloads or short circuit situations. One of the incoming lines also is equipped for synchronizing with an interlock similar to the instrument in use at a real substation. This is operated by a small motor-generator set with a six-volt motor driving a 60-cycle, 115-v generator of about 45-w capacity and connected to one of the line breaker positions with accompanying switch locks.

The board is operated by an instructor using dials and switches located on a remote control cabinet. There he can set up any number of situations or problems including complete station power failures or transformers, circuits, or banks tripping out an overload. He can observe the reactions of trainees to the problems and can check their solutions.

Sound and lighting effects add to the realism. To simulate the hum of transformer banks when energized, a loudspeaker has been built into the board. This hum plus indicating, warning lights, and an alarm bell provides the trainee with much of the atmosphere of an actual substation.

By using the training board, new substation operators can be presented with situations which occur only infrequently at substations. Instruction will provide them with the knowledge of what to do when such situations arise. Moreover, by actually performing the operations, they will be thoroughly schooled in the everyday routine tasks of substation work.

The board and control cabinet were engineered and constructed by employees of the test department without benefit of plans or blueprints. In many cases, the materials used were reclaimed from waste stock and adapted to fit the needs.

R. Arnold E. Davidson, assistant test engineer of the company, supervised the project. W. H. Wells, dispatching superintendent, will use the board in his training program.

This weather protected housing means dependable service

with the KEARNEY TRIPOMATIC

Notice how the lead-in holes for the back-connected terminals *do not enter* the cartridge chamber. This eliminates the source of most troublesome dirt and moisture. And see how the contacts and hanger bracket are *bolted through* the massive porcelain wall. They can never pull out like cemented attachments.

KEARNEY's exclusive *spring* contacts cushion the impact of tube recoil, protecting and prolonging the life of the cutout. The contacts stay in adjustment for high contact pressure . . . even after long service.

274

For Better Construction . . . Safer Maintenance

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Carry

Field-Proved Mechanism

You get a time-tested mechanism in Allis-Chalmers distribution regulators. For more than twenty years, in thousands of applications, this mechanism design has proved itself as the most efficient means of changing taps under load. Laboratory tests show it can withstand over 5 million operations — equivalent to more than a century of operation.

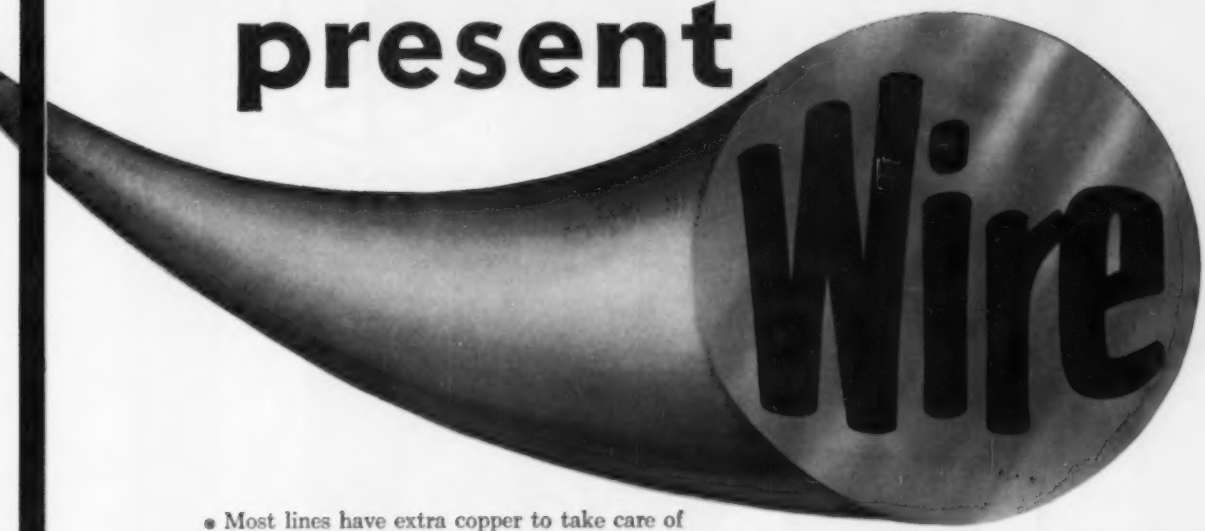
Long-Life Contacts

An important reason why you get satisfactory regulation with a minimum of trouble from A-C distribution regulators is their long-life contacts. Made of arc-resisting materials, contacts are of large size. Laboratory tests prove that they can stand up under the equivalent of forty years of normal operation.

A-C

ALLIS-

double loads with present Wire



• Most lines have extra copper to take care of voltage drop. This provision isn't needed when Allis-Chalmers distribution regulators control voltage automatically. Here's why:

Doubling loads also doubles voltage drop. On a line with 10% voltage drop, for example, doubling the load makes the voltage drop 20%. You can retain the 100% increase in load to serve more customers while bringing the voltage drop back to 10% with an Allis-Chalmers regulator. Its ± 10% range makes increasing loads easy.

All the equipment you buy is Allis-Chalmers distribution regulators. No wire to buy, no expensive labor charges. And at the same time you get close voltage control, which gives you higher revenue, cuts voltage complaints.

Get all the facts on Allis-Chalmers distribution regulators. Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wis.

Unit Construction

You get assurance of years of satisfactory service from A-C distribution regulators, as a result of unit construction. All connections are made and thoroughly inspected before tanking — assuring top-quality workmanship. Same feature makes untanking easy: core, coils, cover, and control form a single unit.

Simplified Maintenance

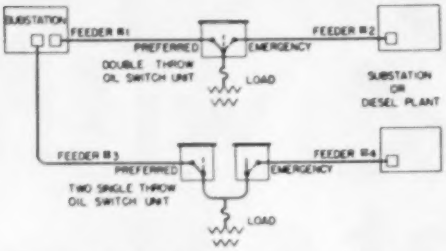
You don't need highly trained servicemen to handle Allis-Chalmers distribution regulators. Take the control, for example. It is simple. Knobs are calibrated and easy to adjust. If needed, you can remove and replace the entire control merely by pulling a single jack plug — there are no other connections to break.

CHALMERS

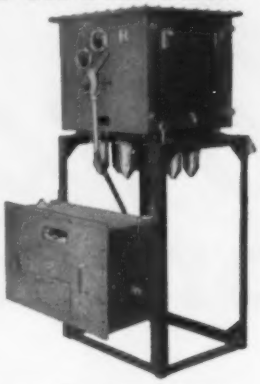
A-4628

INSURE SERVICE CONTINUITY

with G&W Automatic transfer oil switches

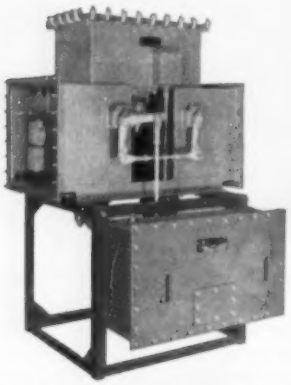


- When preferred feeder voltage fails, the load is automatically transferred to the emergency feeder.
- When preferred feeder voltage is restored (for a period of ¾ minute) the load is automatically returned to the preferred feeder.
- There is no "hunting" on system disturbances. Load cannot be thrown to a "dead" source.
- Model "F6" automatic mechanism provides for remote operator selection of either feeder as the "preferred."

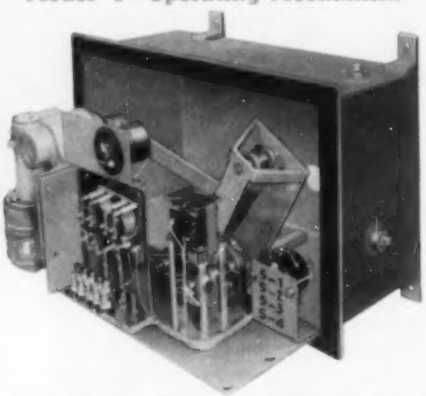


Type "RAD" double throw oil switch unit with Model "F" automatic mechanism.

Model "F" Operating Mechanism



TYPE "DRA" two single throw oil switch unit with Model "F" automatic mechanism. Air filled isolating link box on top.



Improved mechanism removable from watertight case. Motor compresses spring which, when released through action of relays and solenoid, operates the oil switch.

The automatic mechanisms are applied to various forms of Type "RA" oil switches, either for underground cables or overhead connections—up to 23 Kv., 400 amperes. All control wiring is done at the factory. Installation of the unit merely involves connection of the feed and load cables or wires.

Send for Bulletin DA-F which fully describes Model "F" mechanism.

G&W ELECTRIC SPECIALTY CO.

7780 Dante Avenue, Chicago 19, Illinois, U. S. A.

Representatives in principal cities of U.S.A.
In Canada—Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

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D-555

1905
50th ANNIVERSARY
1955

Gas Air Conditioning

Anxious to balance loads, gas industry tests cooler, hopes to grab big share of market

Field tests on a new gas-powered summer air conditioner are now underway, and if all goes well, the Coleman Co, Inc of Wichita, Kan. hopes to get it into limited production next year.

To be powered by a gas motor, the unit would be put on the mass market on a gradually expanding basis, with sharply increased production scheduled for 1957.

The company also expects that still another system of residential gas air conditioning will be in the field test stage next year. This might be binary-type refrigerant jet, adsorption, or open absorption—three other gas cooling cycles on which Coleman is doing research work.

Two Reasons for It

Announcement of the gas powered models was made at a recent Southern Gas Association convention in New Orleans by Sheldon Coleman, president and general manager of the company, and a former president of the Gas Appliance Manufacturers' Association (EW, Nov. 29, 1954, p 64).

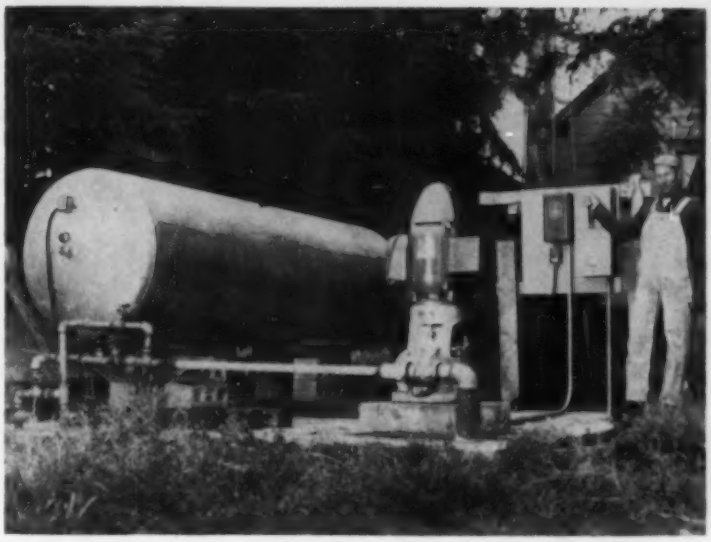
Coleman said the research program stems from a two-prong situation:

- The increasing sales of electric air conditioning equipment which are building a summer peak load on the electric utilities;
- The heavy trend to gas heating which already has built a winter peak load on the gas utilities.

The electric industry, he explained, needs a balancing winter load and, for that reason, is working to develop a satisfactory electric heat pump and electrical resistance heating.

He pointed out that on the other hand the gas industry needs a summer load, which gas air conditioning is intended to supply. In addition, he said that electrical heating threatens the gas heating market, and the gas industry must fight to retain this.

"I sincerely believe," declared Coleman, 'the gas industry has a chance of getting a substantial share of the air conditioning market, with at least a possibility of dominating it."



One Pump Serves House and Fields

This could be the answer to water supply problems for many small farms. Water for both domestic use and irrigation is supplied economically by this single pumping system at the 20-acre Arthur Monstad farm, Kent, Wash. Although field and household systems are usually kept separate, the size of the farm prompted the combination. A 7.5-hp irrigation pump brings water from a 150-ft well and delivers it directly to the fields. When water is needed for domestic supply, valves divert the water into the pressure tank, at left. John Reynolds, Farm Consultant, Puget Sound Power & Light Co, Seattle, Wash.

New Mercury Street Lamp Works on 6.6-Amp Series

A new mercury lamp that can be operated on existing incandescent street lighting circuits with little additional control equipment has been developed by Westinghouse Electric Corp.

The lamp, which operates directly on standard 6.6-amp street lighting circuits, was disclosed recently by Marshall M. Waterman, assistant manager of commercial engineering at Westinghouse's Lamp Division.

"Previous mercury lamps have required separate transformers at each lighting fixture in order to operate on commonly-used 6.6-amp street lighting circuits," said Waterman. "This experimental lamp can be installed directly in sockets now using incandescent lamps with only a minimum of additional control equipment required. Municipalities now using incandescent lamps on a standard 6.6-amp series system will be able to convert to mercury lighting readily at little added expense."

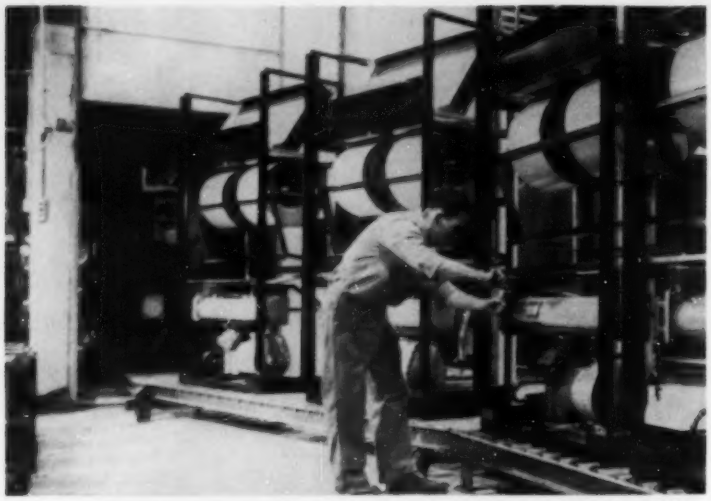
The lamp has a rated light output of 20,000 lumens, and will require about 430 w. It is expected to be made available in conventional mercury and color-corrected fluorescent-mercury types.

1st Quarter Air Cooler Sales 30% Above '54

Sales of room air conditioners for the first quarter of 1955 jumped 50% over the same period of last year, reports the Air Conditioning & Refrigeration Institute.

At the same time, wholesale and factory inventories are down nearly 12% indicating a rapid liquidation of last year's carry-over. These figures, for what usually are the three worst air conditioner sales months, indicate another record year for the industry, said George S. Jones, the institute's managing director.

MANUFACTURERS AND MARKETS



Westinghouse Opens Automatic Plant

Westinghouse Electric Corp recently opened an automatic plant devoted exclusively to the manufacture of packaged air conditioning equipment. Residential and industrial air conditioners, combination heating and cooling units and heat pumps from 2 to 15-ton capacities will be produced at the plant located in Staunton, Va. Maximum production capacity of the 300,000 sq-ft plant is not expected to be utilized before 1958.

Compressor forgings can be completely machined at the rate of 18 per hr on an automated tool which applies 160 individual tools at one time. Material handling is kept to a minimum by conveyor systems. A 10,000-sq-ft air conditioning research laboratory in a section of the building contains a sound study room and five controlled temperature and humidity rooms.

Illustration shows assembled units being inspected as they advance into controlled cycle dehydration ovens prior to evacuation of refrigerant tubing and subsequent charging with Freon.

Herbicidal Brush Control Exhibition by Thompson

Latest brush killing techniques developed by Thompson Chemicals Corp will be demonstrated to the utility industry at the company's Research Station No. 2 along Highway 65 near Branson, Mo. on June 10.

At this meeting Thompson personnel will explain how improved broad spectrum herbicides and advanced application methods have materially stepped up the brush kill and lowered costs. According to a spokesman, practically complete kills of almost all deciduous species of brush and trees is now possible. Better kills also have been obtained from basal and stump applications as the result of improved compounds of brambleweedicide and bramblecide and better creeping agents, it is reported.

Although Thompson manufactures herbicides it does not make spray equipment. However, the company will provide plans for spray technique from truck, tractor, knapsack and airplane.

GE to Erect Capacitor Plant in South Carolina

To meet the demand for radio and TV capacitors, General Electric will step up its production by constructing soon a $6.4 million plant on a 135-acre tract at Irmo (near Columbia), S. C. This plant is scheduled for limited production next year.

The main building will be single-story, windowless, air conditioned and have about 100,000 sq ft of manufacturing area.

Nuclear-Powered Mills Planned by Odlum in Utah

Financier Floyd B. Odlum is considering construction in Utah of two uranium processing mills using nuclear power. Odlum outlined his plans in preliminary discussions with Atomic Energy Commission officials at Grand Junction, Colo. AEC authorization is required for construction of the mills.

Odlum, president of Atlas Corp, said Green River and Moab are being considered for the sites. He said he had already discussed his plans with Westinghouse Corp and North American Aviation, Inc. Both are doing research on reactors.

"We are considering the possibility of having some of the mills in the Green River-Moab area served by nuclear power," Odlum said. "Such a reaction would furnish electric power and also steam to heat processing solutions."

Odlum said construction of the Green River mill would be started in four to six months after AEC authorization and would be finished a year later.

Pittsburgh Standard Opens Mill on 50th Anniversary

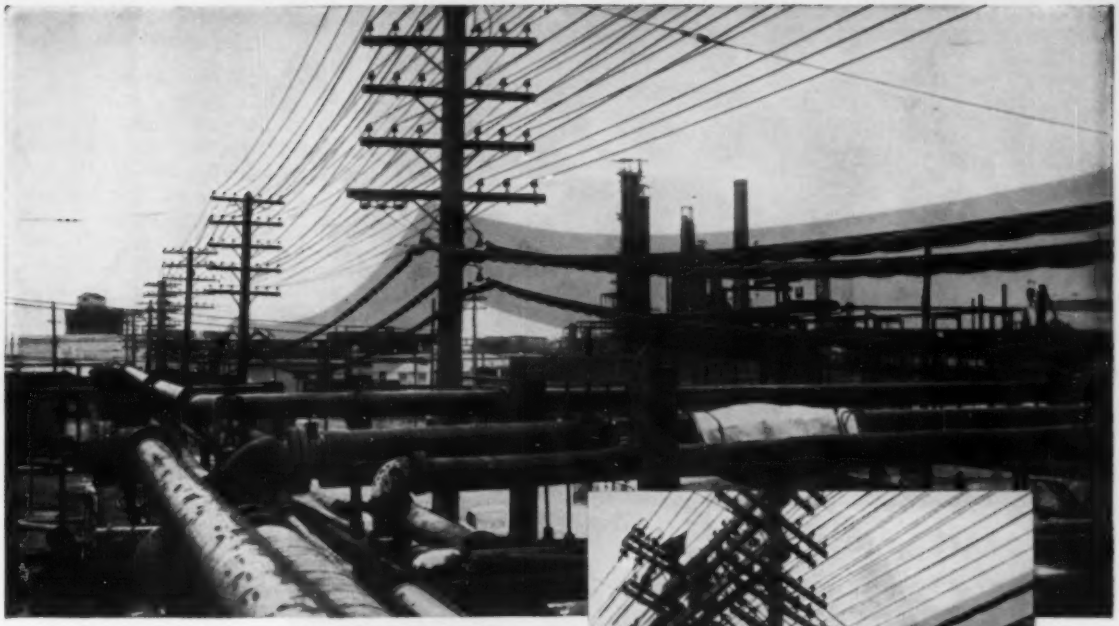
Pittsburgh Standard Conduit Co has entered its 50th year of operation. As a highlight of the anniversary the company has opened an automatic conduit mill at Morrisville, Pa., adjacent to the Fairless Works of the U. S. Steel Co. This mill supplements Pittsburgh Standard's original plant facilities at Etna, Pa, near Pittsburgh.

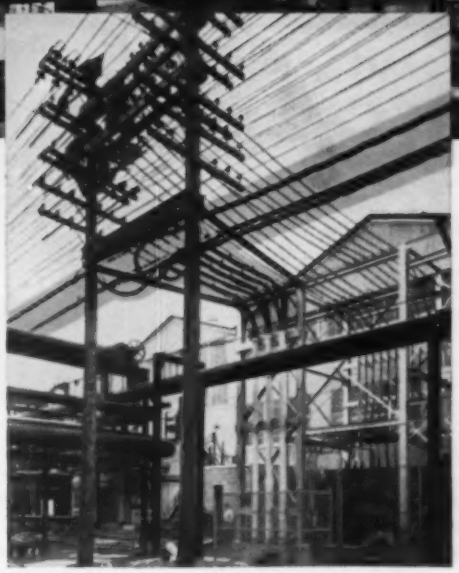
Robert G. McIlroy, company president, announced two advances in thread protection: Use of thread protectors made of polyethylene plastic with a different color for each size of conduit, and galvanizing threads on the hot-dip galvanized conduit.

Copper Production Down

U. S. primary copper production, according to the Copper Institute, in April was 93,143 tons, a decrease from 98,171 tons in March. Refined

(*Continued on page* 59)





1. New Okolite-Okoprene 13.2 kv self-supporting aerial cables take little space on heavily crowded poles at the Gulf Oil Corporation's Philadelphia Refinery.
2. Primary distribution circuits in conduit leaving substation and rising in conduit to poles.

REFINERY EXPANDS POWER DISTRIBUTION *with* OKOLITE-OKOPRENE SELF-SUPPORTING CABLES

A major increase of power line capacity utilizing heavily crowded existing poles at the Gulf Oil Corporation refinery in Philadelphia was made possible by the use of Okolite-Okoprene self-supporting aerial cables. The 15 kv shielded construction permitted easy, rapid installation despite the presence of "hot" lines on the poles which could not be shut down during the job.

The neat appearance, increased safety and space savings obtained through the use of self-supporting aerial cables are evident in this installation. In addition, simplicity of installation and ease of handling mean lower construction costs. Okolite-Okoprene is also well known for its resistance to weather extremes, moisture, most oils and greases, and the common acids and alkalies.

Write for Bulletin EW-1074, for detailed information on Okolite-Okoprene self-supporting aerial cables to The Okonite Company, Passaic, N. J.

Available with either copper or aluminum conductors

OKONITE *insulated cables*

2282

This is the terminal insulation for a 34.5 Kv low-pressure gas-filled cable. Its duties are both electrical and mechanical. Electrically, it provides the medium for changing the paper insulation of the cable to the air insulation of the open conductor. Mechanically, it serves as part of a leak-proof joint which confines the gas in the cable.

Specification of performance characteristics of cable and cable accessories has in recent years become a matter of increasing scientific exactitude. Thorough engineering and control have replaced guesswork. In this development, Lapp is proud to have been able to provide ceramic design and production facilities apace of progress in the field.

On this piece, both ends, as well as the flange bearing surface, are ground for gasketing. To provide for dielectric grading, an area at the center is conductive-glazed, and the tapered surface is precision-ground for application of dielectric grading materials.

This is typical of but one of the many types of problems involving high-voltage insulation solved by Lapp. Lapp design and Lapp production methods add reliability and service life to equipment insulated by Lapp porcelain and Lapp porcelain-metal assemblies.

Porcelain by LAPP, in complicated special shapes, or in insulators for line and station use, is a guarantee of operating security, long life, low upkeep.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

Copper Production

(*Continued from page 56*)

copper production was 122,129 tons, down from 135,700 tons in March and 123,162 tons in February, which was the lowest this year to date. Deliveries to fabricators were 119,863 tons, compared to 131,354 tons in March and 108,503 tons in February being the lowest to date this year. Refined stocks were 42,759 tons, the lowest to date in 1955, and down 3,332 tons from March.

Pole Star Transformers to be Permanently Sealed

Pennsylvania Transformer Co of Cannonsburg, Pa., will soon feature "Perfect Seal" Pole Star distribution transformers. This new development is metallically sealed and gasketless. Units will be available in sizes from 5 to 25 kva, 2.4 through 14.4 kv.

W. R. Swoish, company vice president, states that the transformer is practicable because of "a decided trend toward no-tap transformers and few series multiple connections." He reports that all internal electrical connections are brazed or crimped and all mechanical connections are welded, soldered or riveted. According to the company no elaborate shop tests are needed before installing the transformer.

American Standards Published or In Process

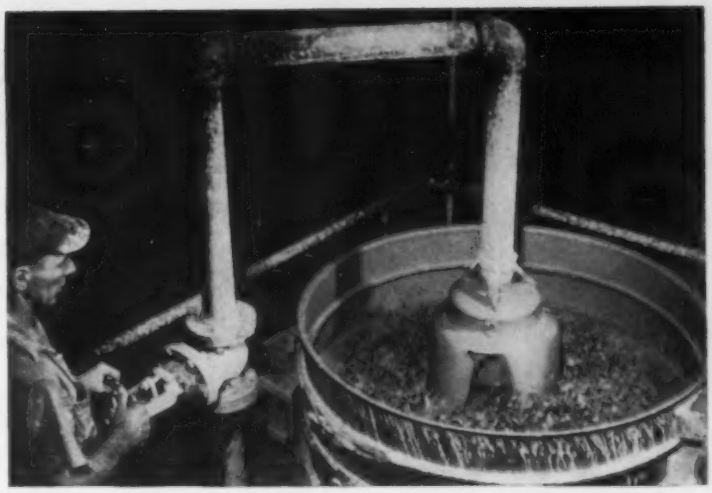
American Standards Association has advised the status of the following Standards:

Published Recently—Schedules of Preferred Ratings for Power Circuit Breakers, C37.6-1955 (Revision of C37.6-1953); price $0.40. Switchgear Assemblies and Metal-Enclosed Bus, C37.20-1955; AIEE No. 27; price $0.60. Test Code for Polyphase Induction Motors and Generators, C50.20-1954; price $0.80.

In Board of Review—Asbestos, Asbestos-Varnished Cloth and Asbestos-Thermoplastic Insulated Wires and Cables, C8.36; NEMA WC1-1955.

In Standards Board—Following are on Wet Process Porcelain Insulators: Suspension Type (EEI TDJ-52; NEMA 140-1952), C29.2; Spool Type (EEI TDJ-53; NEMA 141-1952), C29.3; Strain Type (EEI TDJ-54; NEMA 142-1952), C29.4; Low-and Medium Voltage Pin Type (EEI TDJ-55; NEMA 143-1952), C 29.5; High-Voltage Pin Type (EEI TDJ-56; NEMA 144-1952), C29.6; High-Voltage Line-Post Type (EEI TDJ-57; NEMA 145-1952), C 29.7.

Project Initiated—Terminology for Automatic Controls, C85.



Ohio Brass Traps "Pre-Historic" Hairs

Extra-fine screens and trapping devices have been installed in the clay piping system of the Ohio Brass Co's Barberton plant. These measures were taken to catch fibres which were passing clay filter screens with openings of only a few thousandths of an inch. OB says that removal of these fibres constitutes a refinement in the process of clay manufacture since organic material in porcelain is burned away in the kiln and leaves a void of potentially weak strength.

Analysis shows these fibres to be predominantly animal hair; and since no other explanation fits the circumstances, these hairs have tentatively been identified as those of pre-historic animals.

Picture shows clay slip pouring into vibrating screen.

M & M BRIEFS

The Anaconda Co is the new name which will be effective June 18 on the 60th anniversary date of the founding of the Anaconda Copper Mining Co. The new name will be used because of the widening scope of the company's activities in lead, zinc, gold, and silver, as well as mining and processing of uranium ores and entry into primary aluminum production.

The Wakefield Company is the new corporate name for the F. W. Wakefield Brass Company at Vermilion, Ohio, states A. F. Wakefield, general manager. He said that there is no change in the name of the Canadian subsidiary, Wakefield Lighting Limited, London, Ont.

B. F. Goodrich Chemical Co has a $2.5 million plant expansion program to double capacity of its synthetic rubber plant in West Louisville, Ky. Work is to start this month and building completion is scheduled for 1956.

Electronics Corp of America will occupy new headquarters late this year at One Memorial Drive, Cambridge, Mass., according to Arthur G. B. Metcalf, ECA president. The leased building will provide 208,000 sq ft of floor area. Another 100,000 sq ft of manufacturing area is planned for the Cambridge facilities. Some products include photoelectric and electronic controls, combustion control systems, fire detection devices and electronic business machines.

BUSINESS OUTLOOK

Electrical World
JUNE 6, 1955

The outlook, in brief: Very good for the rest of the year. The summer cut in auto output will be offset by rising construction and increased spending for new capital equipment. For the longer range outlook, rosy hopes of real peace—thanks to Russia's soft talk on disarmament.

—•—

Industries making industrial equipment—other than electrical equipment—may be the next to pick up. So far, non-electrical machinery hasn't shared in the general business boom.

Now the orders are rolling in. The McGraw-Hill index of new orders for non-electrical machinery went up 2% in April—to a point more than 23% higher than in April one year ago. Orders have been going well since last fall, and it's about time for production to follow suit.

For those interested in specific lines of machinery, here's how orders are going for some major products:

Engines and turbines—April new orders the highest for that month in seven years, 25% higher than in April 1954.

Pumps and compressors—Second highest April in seven years. Only three months in the past seven years have been better.

Construction and mining machinery—April new orders 21% above last April.

Metalworking machinery—Orders down sharply in April, after a good first quarter.

Other industrial machinery—Orders down in April, but still 14% higher than in April 1954. March-April 1955 were the best two months for orders for this equipment since April-May 1952.

Office equipment—Orders off slightly from last year.

—•—

Higher highway construction will continue to bolster the economy next year and the year after—even if nothing is done in Congress on the President's proposed highway program. Highway building is rising about 10% a year, even without the new program.

Chances still are, though, that Congress will pass a new roadbuilding bill. Political and economic pressures for better roads are too great to resist for long. And the resulting greatly expanded highway program will help bring lots of new customers for utilities in the next few years.

New talk of world peace is worth watching for longer run business implications. It's hard to believe it's possible. But Russians have been more accommodating than ever before in disarmament talks. Combined with plans for a "summit" meeting this year, this has raised new hopes for an end to cold war. Probably won't happen, considering past experience with the Russians. **But it would mean such great changes for business—lower taxes, probably new government spending programs—that it's worthwhile to keep one eye on the possibilities.**

Here's Proof of Performance...

Pressure-creosoting increases pole life for Consumers Power Company

• In 1931, Consumers Power Company, serving 64 Michigan counties, stopped the use of untreated and butt-treated poles in its rural distribution systems in favor of pressure-creosoted poles. Today approximately two-thirds of the company's poles in electric distribution lines are pressure treated, 80% of those being full length pressure-creosoted Southern Yellow Pine.

The average cedar pole, used until 1931, had a normal life expectancy of 23 to 25 years at the most. The life expectancy excluding losses for other than natural causes, of the pressure-creosoted Southern Yellow Pine poles being purchased today is probably upwards of 40 years, according to George A. Clark, Electric Distribution Supervisor.

Pressure-creosoting, according to Mr. Clark, gives positive penetration averaging over 80% of the sapwood and with the use of modern vacuum processes after treatment, today's poles are dryer and cleaner.

In the company's scheduled maintenance program, its full-length pressure-treated poles are not to be given a boring inspection until they have been in service 25 years.

Long life and cleanliness go hand in hand when you use pressure-creosoted poles. Especially if USS Creosote is used. If you would like more information, contact the nearest Coal Chemical sales office listed below or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

You can obtain clean pressure-creosoted poles upon specification without sacrificing pole service life.

Close-up, at right, of a Consumers Power Pole, showing 1937 dating nail.

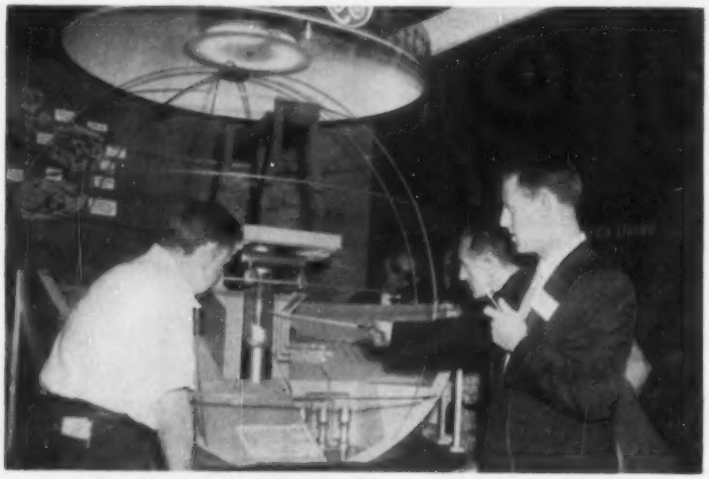
Pressure-creosoted poles in a rural line of Consumers Power Company, Jackson, Mich.

USS CREOSOTE

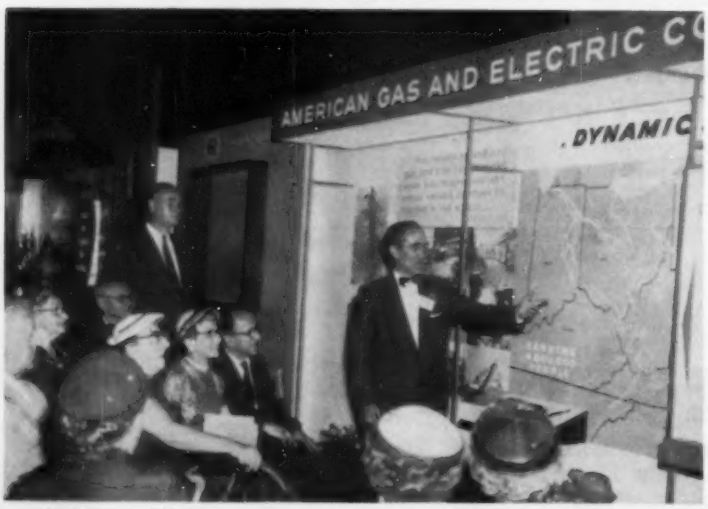
SALES OFFICES IN PITTSBURGH, NEW YORK, CHICAGO, CLEVELAND, SAN FRANCISCO AND FAIRFIELD, ALA.

UNITED STATES STEEL

Archy, show's puppet symbol, says you must invest . . .



to help manufacturers develop atomic reactors . . .



to help utilities supply tomorrow's kwhr load

Investors Show . . .

. . . sponsored by Merrill Lynch and industry teaches people how to become security owners

"Since America began, our industrial system has depended for its driving force on one primary source of power . . . invested capital. And people have invested their capital in business because it promised to pay them a good return. This is the story of how that promise has been fulfilled . . . and of how you can share in the promise of tomorrow."

This is the statement that appeared as you entered the 'How to Invest Show", the first such event of its type in New York held on May 24-30.

It was sponsored by Merrill Lynch, Pierce, Fenner & Beane, a leading New York Stock Exchange investment house. Participants included the American Gas & Electric Co, and General Electric Co, from the electrical industry, and the International Business Machines Corp.

Show's Puppet Symbol: Archy

Archy, a puppet symbol of the show (see photograph on left), dramatized the investment process. A puppet show enabled people to see how stocks and bonds were actually traded on an exchange.

The participation of American G&E in the show typifies the vital stake which the electrical industry has in encouraging investment in the large expansion program contemplated for the next decade.

Among the exhibit highlights were:

- American G&E's entire exhibit had a theme, "Electricity—the life blood of America." It showed a panel which read: "The American Gas and Electric System produces more electricity than any other private company or system in the world."
- General Electric Co's display of "Progress Through Research and Engineering," showed seven research projects that were coming on the market, including man-made diamonds, a kitchen of the future, a scale model atomic plant (see photograph on left), an automatic factory, newest jet engines, and a brand new type of automobile headlight.

The model of the atomic plant is

a replica of the one GE will build for the Commonwealth Edison Co in Chicago, Ill., in which the Nuclear Power Group is participating.

• The International Business Machines Corp showed its electronic brain in action.

Ten exhibits by Merrill Lynch answered the basic questions about the investment business—what common stocks are, who owns them, how they are bought and sold, what benefits they have returned to investors, and how any individual should approach the problem of investing.

FINANCIAL BRIEFS

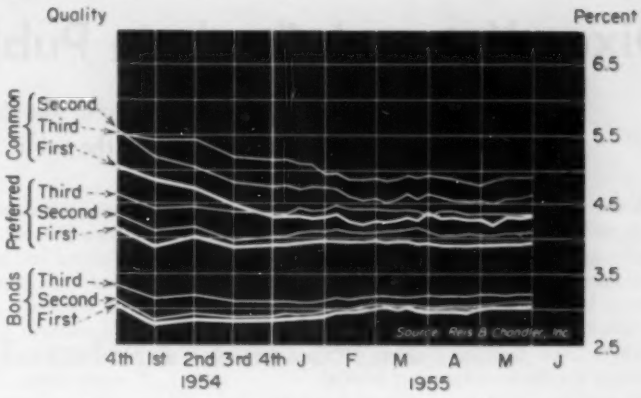
New York Life Insurance Co has purchased 24,000 shares of 4.35% Series "F" preferred stock of Long Island Lighting Co . . . **Pennsylvania Power & Light Co** has received Public Utility Commission approval to merge Pennsylvania Water & Power Co into it. Company also received Securities and Exchange Commission approval to sell Pennsylvania W&P's subsidiary Susquehanna Transmission Co, for about $5 million.

American Gas & Electric Co has registered 192,000 shares of its common stock with the Securities and Exchange Commission. They will be offered by subscription pursuant to American G&E Key Employee Purchase Plan.

Consumers Power Co is planning to sell 100,000 shares of preferred stock and 373,689 shares of common stock. The common stock will be offered to stockholders on the basis of one share for each 20 shares held . . . **Long Island Lighting Co** is planning to offer subscription rights to its commonholders about July 1, to subscribe to 624,170 additional shares on the basis of one new share for each ten shares held.

Florida Power & Light Co will pay June 30 a quarterly common stock dividend of 25¢ a share on the new common stock. This is equivalent to 50¢ a share on the old stock, which will be split two-for-one effective June 13. The old stock received 45¢ a share quarterly . . . **Miamisburg, Ohio,** voters will ballot next November on whether the town should expand its light plant facilities or buy power from a private utility.

Today's Utility Yields—(%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
May 26	3.04	3.09	3.21	3.95	4.08	4.35	4.34	4.62	4.84
May 19	3.03	3.09	3.21	3.93	4.07	4.35	4.31	4.58	4.84

Utility Earnings

COMPANY	PERIOD MONTHS ENDED		NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Consumers Power	12	April	$27,482,495	$25,621,287	$3.23(a)	$3.17(a)
Houston Lighting & Power	12	April	13,183,309	10,721,136	2.19	1.96
Middle South Utilities, consolidated	12	April	16,586,380	14,842,833	2.18(b)	2.08(b)
New York State Electric & Gas	12	April	9,726,492	9,508,010	2.68	2.66
Southern Co, consolidated	12	April	23,746,914	22,646,020	1.31	1.25
Southern Indiana Gas & Electric	12	April	2,666,452	2,259,221	2.47	2.02
Texas Utilities Co, consolidated	12	April	23,140,804	19,618,324	3.92	3.32
Virginia Electric & Power	12	April	17,921,368	13,848,360	2.37(c)	1.93(c)

Notes—(a) Based on average shares outstanding; (b) Based on 7,600,000 shares in 1955 and 7,125,000 shares in 1954; and (c) Based on 6,600,000 shares in 1955 and 5,999,980 shares in 1954.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
MAY 26—JUNE 1			
COMMON STOCK			
Public Service of New Hampshire—413,016 sh (being offered commonholders on 1-for-6 basis, record May 24 to expire June 7)	$6,918	$16.75	5.37%
SCHEDULED FOR JUNE			
BONDS			BID DATE
Virginia Electric & Power—1st mtg due 1985	$25,000	.....	June 7
Central Illinois Electric & Gas—1st mtg due 1985	4,000	.....	June 7
Oklahoma Gas & Electric—1st mtg due 1985	15,000	.....	June 21
PREFERRED STOCK			
Southwestern Gas & Electric—60,000 sh $100 par cum	$6,000	.....	June 7
COMMON STOCK			
Public Service of Colorado—303,010 sh (275,464 sh to be offered commonholders on 1-for-10 basis, record June 3 to expire June 20; 27,546 sh to employees)	.....	.....	.....
Baltimore Gas & Electric—875,856 sh (to be offered commonholders on 1-for-10 basis, record June 7, to expire June 22)	.....	.....	.....
Kansas City Power & Light—245,000 sh (to be offered commonholders on 1-for-10 basis, record June 9 to expire June 27)	.....	.....	.....

Dixon-Yates—A Study in Public Relations

The contract that sparked a political storm was the cause for great rejoicing in West Memphis, Ark., last week. "Tell the public" campaign turned the trick

A tremendous celebration in West Memphis, Ark., last week marked the groundbreaking for the huge $107-million generating plant of the Mississippi Valley Generating Co. Governor Faubus along with the Arkansas Senators were to have been there for the parade and barbecue. Playing prominent roles were Edgar H. Dixon, president, Middle South Utilities, Inc; and Eugene A. Yates, chairman, the Southern Co, the men who head MVGC.

By now the Dixon-Yates venture is a politically popular enterprise in and around West Memphis. More than that, it is a politically acceptable venture in most of the remainder of the country. The community-sponsored groundbreaking ceremonies last week caused hardly a ripple on the national political scene. Big scale efforts by a public-power-minded minority have apparently failed. Even the active participation of men such as former President Truman and former Tennessee Valley Authority Director David E. Lilienthal a few weeks earlier failed to resurrect the controversy that attended the Dixon-Yates contract last summer and fall.

Once a Political Issue . . . During that time the negotiations and contract had many of the earmarks of a national political issue which threatened to have repercussions among the whole electric utility industry. A small group of opponents flung all sorts of innuendo and insinuation at the negotiations. There were charges of profiteering and improper pressures which reached to the very door of the White House.

Main reason for this dramatic shift in the political climate surrounding the Dixon-Yates contract is that it has been sheared of all secrecy and put before the public. Federal officials as well as utility leaders have explained and interpreted it clause by clause. It is now apparent to all interested citizens that the contract is favorable to the government in every respect. It provides no guaranteed rate of return as was frequently charged. Even the maximum return allowed under the contract is more modest than that realized under ordinary utility operations.

Lesson for the Industry . . . The vigorous "tell the public" campaign waged by Messrs Dixon and Yates probably did most to take the contract out of politics and put it into business. Their appearances before the National Press Club, numerous radio and television forums, and their frequent interviews with newsmen did much to gain public acceptance for the contract.

The Dixon-Yates story is truly a lesson in public relations for both the federal administration and the utility industry. As long as the proposed contract was shrouded in an air of mystery, it was fair game for the political opponents. Once the full story was brought before the public, the negotiations and the contract were removed from narrow partisan politics. The lesson is simple: The best public relations consists of giving the public the facts as quickly and as fully as humanly possible. To gain the confidence of the public, it is vital to have confidence in the judgment of the public.

The celebration down in West Memphis last week should help to drive home this point.

TECHNICAL NOTES

Perimeter of the sheath around a current-carrying conductor is the criterion of its shielding; a square shield **d** in. across gives 25% more shielding than a circle of diameter **d.**

Watthour meters generally tend to run slow when tilted, as by mounting on a non-vertical pole or the sloping clapboards of a house.

Silicic concrete sand has sufficiently good thermal conductivity for use as back fill around buried cable if its water retention is good and its thermal resistivity not too high at zero water content.

Nuclear cross-section is a term indicating the probability of reaction between a nucleus and a neutron. The unit is 10^{-24} sq cm and is called a "barn." Zirconium has low (0.18 barn) cross section for thermal neutrons and high strength at high temperature.

Sweden broadcasts radio programs using the 230 and 380-kv power lines as antennas in conjunction with power levels that exceed the interference level sufficiently to render line disturbances inaudible.

Madrid's street lighting, extensively damaged by the Spanish civil war, is acquiring new brilliance with fluorescent and mercury fixtures.

Ceramic materials become electrically conductive at high temperatures. For pure alumina a white heat is required.

Maximum load area coverage of a distribution feeder pattern is obtained when the percent voltage drop in the last lateral is 1/3 the allowable percent voltage drop and the other 2/3 occurs in the main.

Gas coolants for nuclear reactors might drive 1,400 F gas turbines. They are not economical for steam production.

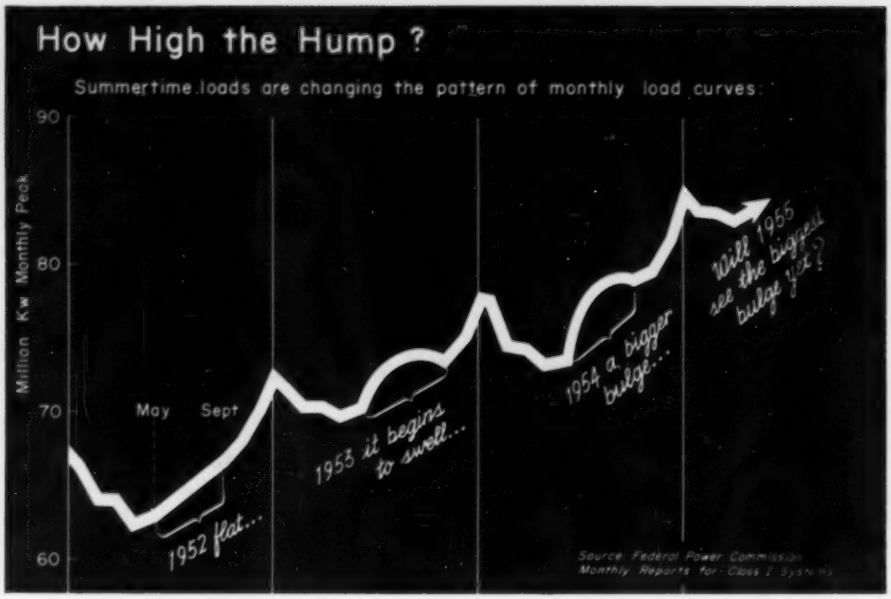
Buy Proved Insulator Performance

...it's WORTH the price!

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

STATISTICS



Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	Apr.	105.30	104.93	93.56	12.5
Peak—Class I Systems (million kw)	Mar.	83.4	83.9	74.8	11.5
Estimated Dec.'55 Peak (million kw)	Mar.	96.5	96.4	96.0	0.6
Production—billion kwhr	Mar.	44.45	40.23	38.92	14.2
hydro		10.40	8.57	9.92	4.8
fuel		34.05	31.66	29.00	17.4
Sales—billion kwhr	Mar.	39.94	38.99	34.43	16.0
residential		11.08	11.57	9.88	12.2
commercial		6.20	6.20	5.68	9.1
industrial—includes sales to AEC		20.36	19.11	16.76	21.5
other		2.29	2.11	2.12	7.9
Fuel Consumption	Mar.				
coal—million tons		11.51	11.09	9.89	16.4
oil—million barrels		6.81	7.43	6.46	5.5
gas—billion cu ft		83.41	63.63	78.23	6.6
Net Income Class A & B Co's—$ million	Feb.	121.07	112.60	108.39	11.7
Residential Customers—millions	12 mos.	43.35	43.26	42.10	3.0
revenue per kwhr	ended	2.68¢	2.69¢	2.73¢	−1.8
avg. kwhr per customer	Feb.	2,587	2,564	2,385	8.5
avg. annual bill		$69.33	$68.97	$65.11	6.5

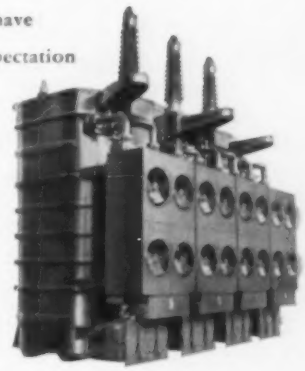
Business Statistics . . .

Indexes: 1947–49 = 100					
FRB Industrial Production	Apr.	137	137	124	10.5
ENR Construction Cost	May	137.0	135.7	129.7	5.6
BLS Cost-of-Living	Apr.	114.2	114.3	114.6	−0.3
NEMA Sales	Mar.				
insulation materials		160	137	136	17.6
electric appliances		126	118	105	20.0
household refrigerators		106	94	89	19.1
Wholesale prices	Apr.				
motors and generators		120.5	120.5	124.1	−2.9
transformers and regulators		127.3	127.3	128.1	−0.6
switchgear and fuses		135.5	135.5	135.1	0.3
GNP—annual rate—$ billion	1st Qtr.	$370.0	$362.0	$355.8	4.0

REPEAT
TRANSFORMER BUSINESS

Because of the fine operating records of our transformers we have enjoyed a great deal of "repeat business." However, if this expectation was built upon "repeat business" due to replacement, our future would be rather dreary. Utility and industrial expansion, necessitating more transformers in ever increasing ratings, creates a need for our product... and much of this need will be "repeat business."

Just added proof... when you specify Moloney, you specify "Dependability at its Best."



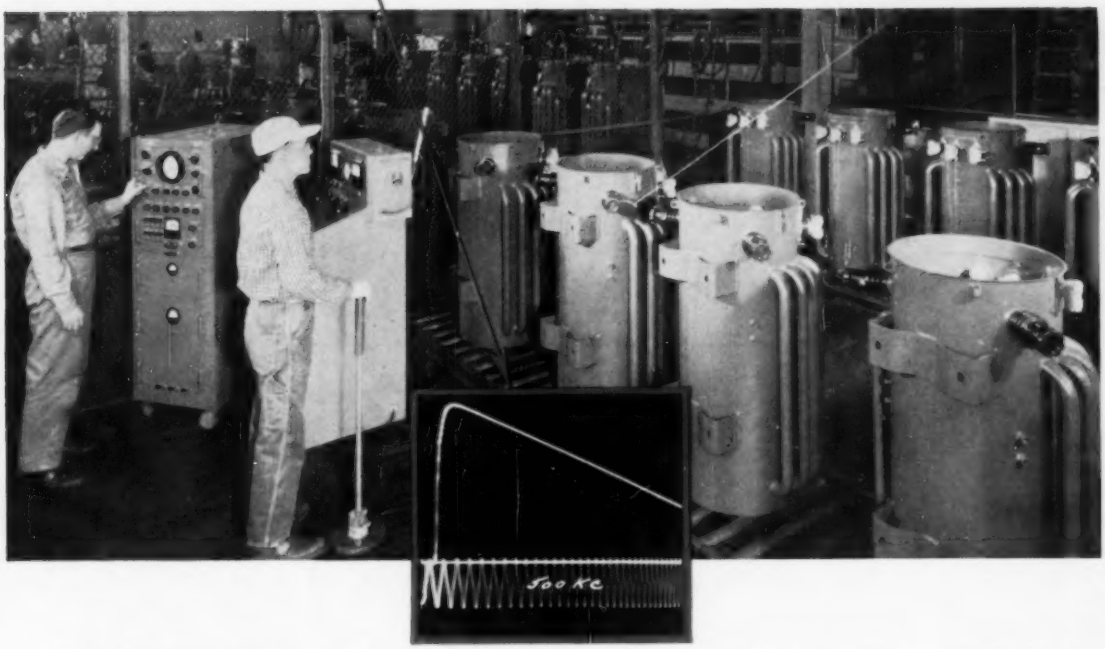
M555-14

MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Step Voltage Regulators • Regulating Transformers • Load Tap Changing Transformers • Load Center Transformers • Unit Substations • Network Transformers • Constant Current Transformers • Capacitors • Transformers For Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

Production-Line *Impulse Test* for Every Distribution Transformer



Using the most modern impulse testing and recording equipment, Allis-Chalmers gives you proof of insulation performance for every distribution transformer through 500 kva, 69 kv. These tests are made both on conventional and self-protected designs.

Allis-Chalmers initiated production-line impulse testing to assure that no transformer can be shipped without positive proof that insulation can withstand severe lightning and line surge conditions. No lightning arrester is used in these tests. Allis-Chalmers tests the tranformer, not the lightning arrester.

It will pay to get complete information about this and other Allis-Chalmers tests and production procedures that result in distribution transformers of highest quality. Contact your nearby A-C office or write Allis-Chalmers, Milwaukee 1, Wisconsin, for additional information. A-4638

ALLIS-CHALMERS